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THE NEW ZEALAND RECENT AND FOSSIL MOLLUSCA OF THE FAMILY TURRIDAE

With general notes on Turrid nomenclature and systematics.

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WHAOWHIA

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INTRODUCTION.

The Toxoglossa, which has proved one of the most difficult gasteropod groups to classify, was founded to cover the *Conidae*, *Turridae* (= *Pleurotomidae*) and *Terebridae*, and, as the name suggests, the feature of the group is the extraordinary toxic quality of the radula. Specialised members retain only the marginals which are developed as slender teeth, frequently barbed and fitted with poison glands and ducts. A number of instances are on record of fatal consequences to humans in respect to several well known tropical Cones. All the Conid radulae so far examined are typical, but in the *Turridae* diversity occurs, some having the specialised toxoglossid radula of slender marginals only, others have a well developed central tooth and massive marginals, while a few retain what can only be interpreted as the prototypic radula in which both the central and lateral teeth persist as well as the marginals.

Owing to the presence of typical toxoglossid dentition in both the *Conidae* and in some of the genera of the *Turridae*, several authors (Fischer, 1887, Cooke, 1895, and Thiele, 1929), have merged the latter in the *Conidae*. On shell characters, however, there is no great similarity between the inverted truly conic form of the *Conidae* and the fusiform turretted-spired *Turridae*, a striking feature of which is the well developed anal siphonal notch in the outer lip. Certainly there are a few Turrids of Conid form, and on the other hand some Cones have a well marked subsutural sinus, but these cases are due to chance resemblances only, for the Conid sinus cannot be exactly matched in the *Turridae*. Chance resemblance in another direction results in the extreme *Pusionella* so closely resembling a short-spired Terebrid that it also has suffered disassociation from the *Turridae*, although it can be shown that its true place is near the undoubted Turrid genus *Perrona*. Finally, there is the extremely shallowly sinused *Mitromorpha* and its allies that simulate the rachiglossid Mitras, and others such as *Antiguraleus* nov. (described herein) which bear striking resemblance to certain Trophons.

It is inevitable that the *Turridae*, the most prolific gasteropod family both in genera and species, with a definite time range extending back well into the Cretaceous, and the probability of a much earlier inception, should now be represented by many and varied lines of descent. *Turriculina* Gregorio, 1930, if really Turrid, as stated by its author, is based upon a Liassic fossil from Sicily. I have had no opportunity, however, for verifying this important earliest Turrid record. It is futile now to attempt to link the modern forms with a single prototypic ancestral line—the early faunas are insufficiently known for this. It is possible, however, to arrange the numerous genera into phylogenetic groups and with reasonable precision to determine their position in the sequence.

Classification of the Turridae has been greatly hampered by several factors, the principal one being that although species are exceedingly numerous, few are intertidal, and most occur sparsely, so that a range of specimens is seldom obtainable even by dredging, and hence the exchange of representative comparative material between Museums and research workers is seldom practicable. This paucity of material is reflected in the very few species that have been described anatomically. Also, Turrid form and sculpture is so conservative that it would appear on first acquaintance that genera are based upon small differences. However, when these "small differences" are investigated, they assume a greater importance, and although a large number of generic divisions are necessitated, it is only by this wholesale method that phylogenetic series are adequately segregated.

Another factor tending to retard a satisfactory understanding of the *Turridae* is that of the nomenclature, for although some 362 generic names have been proposed in the family, far too many have been published irrespective of any taxonomic scheme, and hence a big percentage are synonyms. Prior to the rigid adherence to correct procedure in type designation, most workers found the host of nominal Turrid genera difficult to apply and certainly unwieldy. This occasioned retrograde action in the recognition of only a few stock genera such as *Pleurotoma, Drillia, Mangelia, Glyphostoma, Clathurella, Cythara* and *Bela*. Thus genera for the most part of restricted application were used incongruously in a world wide sense, irrespective of distribution; geographically, bathymetrically, or in time. Since the bulk of the Turrid species were described in this arbitary manner the generic location of most species is subject to revision.

Of recent years several workers have done excellent service in the matter of phylogenetic treatment, and the type fixation of many of the older Turrid names. In particular, Cossmann, Dall, Finlay, Hedley, Iredale, Grant and Gale, Marwick and Woodring merit special mention.

Turrid genera have evolved along so many divergent lines and have resolved into so many restricted geographic groups that even this apparent superfluity of names is inadequate, and it has been found necessary to propose a further series in order to more critically express the local fauna.

Of the 362 Turrid names listed herein, 284 (including *Speightiidae* and *Thatcheriidae)* are not only valid from a nomenclatural standpoint, but also appear taxonomically sound. However, when the systematics of the whole family are more critically investigated this number will doubtless be further reduced. Thirty-one new genera additional to these 284 names are proposed in this bulletin.

The original purpose of this bulletin was merely to describe the New Zealand Recent and fossil *Turridae,* but the systematics of the family were found to be so confused that a general scheme of classification had to be worked out and an attempt made to evaluate the great number of genera already admitted to the family. Unfortunately, lack of space prevents the inclusion of full notes on the foreign genera except where there is a direct bearing upon a New Zealand species.

In 1918, Dall in his *"Notes on the Nomenclature of the Mollusks of the Family Turridae,* Proc. U.S. Nat. Mus. 54, pp. 313-333, provided a useful synopsis of Turrid generic names, but many were omitted and, of course, a great number have been proposed subsequently. Herein I provide an up to date list believed to be complete, in which synonyms are noted and the type species cited, together with particulars of locality and, in the the case of fossils, the geological horizon as well.

This bulletin covers the descriptions of 31 new genera and subgenera and 144 new species, bringing the New Zealand Turrid fauna to the surprising total of 389 species. Two allied new families are proposed also, these covering a further five species. Of the nine Turrid subfamilies adopted or proposed herein, all are represented locally except the *Clavatulinae,* but this omission is not surprising, for that subfamily is mainly Recent African and European Tertiary in distribution.

The earliest New Zealand Turrids are Upper Cretaceous, but since the Cretaceous genera both here and elsewhere had by then already achieved a complex divergence, so we must assume a much earlier inception for the family.

The New Zealand *Turridae* covers 74 genera, 38 of which are precinctive, 19 occur in the Australian Recent, upper and middle Tertiary faunas, 2 have a considerable Recent

Indo-Pacific range, and 15 are more widely distributed, some occurring in European and North American lower and middle Tertiary horizons. These facts are particularised in the stratigraphical table on page 172.

It was originally intended to include the Australian Tertiary fauna as well, for there are many new species, but this manuscript has already grown so large that the Australian section is reserved for separate publication.

ACKNOWLEDGMENTS.

This work has been made possible by the generosity of Dr. H. J. Finlay, who had contemplated the publication of a Monograph of the New Zealand *Turridae,* and to this end had for some years amassed a large collection of New Zealand Tertiary and Recent material, foreign genotypes and literature. All this material, contained in the Finlay collection now in the Auckland Museum, and extensive notes were made completely available. I am grateful also to Dr. J. Marwick, who generously made available all the Turrid material in the Geological Survey Office, Wellington, including some thirty undescribed species; to Mr. J. Grant, Director of the Wanganui Museum, for the loan of types; and to Dr. C. R. Laws, Auckland, for the opportunity of including several species which he had already separated as new. Finally, for the careful perusal of the manuscript I am deeply indebted to both Dr. Finlay and Dr. Marwick for much helpful criticism.

MATERIAL.

In addition to the large amount of material in the Finlay collection and the loaned material from the Geological Survey, Wellington, I have had the added advantage of the use of the extensive collections in the Auckland Museum, my own reference loan collection, and further notes gleaned from many sources. Notwithstanding this extensive material, there are many genotypes of which I have been unable to examine material, but as there is little probability of these becoming available in the near future, I have decided to publish, particularly as the missing data is not likely to affect materially any issues involving the New Zealand fauna.

NOMENCLATURE.

SYNOPSIS OF TURRID GENERIC NAMES.

(Names in lighter faced type are considered to be synonyms; those in brackets were originally, or later, ascribed to the *Turridae,* but are no longer included in that family. New genera and subgenera proposed herein appear at the end of this list. For page references in brackets see bibliography at end of this bulletin.)

ACAMPTOGENOTIA Rovereto, 1899 (p. 103) Nom. nov. for *Pseudotoma* Bellardi, 1875; non Gray, 1825. Type (monotypy): *Murex (Pleurotoma) intortus* Brocchi, Oligocene to Upper Pliocene of Europe. Figd. Grant & Gale 1931 (Pl. 25, figs. 1a, 1b) = *Pseudotomina* Finlay, 1924 (p. 515) Nom. nov. for *Pseudotoma* Bellardi .... CONORBIINAE.

ACMATURRIS Woodring, 1928 (p. 184) Type (o.d.) : *A. comparata* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 7, f. 12) .... MANGELIINAE

ACRISTA Hedley, 1922 (p. 285) Type (o.d.) : *Lienardia punctilla* Hedley. Recent, Queensland. Figd. Hedley 1922 (Pl. 49, f. 99) .... MANGELIINAE

ACROBELA Thiele, 1925 (p. 238) Type (o.d.) : *A. optima* Thiele. Recent, 463 metres E. Africa. Figd. Thiele 1925 (Pl. 25, f. 19). = *Microdrillia.* Non *Acrobela* Foerster, 1862.

ADELOCYTHARA Woodring, 1928 (p. 171) Type (o.d.) : *A. primolevis* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 6, f. 11) .... MANGELIINAE

AFORIA Dall, 1889a (p. 99) Type (o.d.) : *Pleurotoma circinata* Dall = *Pl. insignis* Jeff. Recent, Bering Sea to Fuca Strait, deep water. Figd. Dall 1921 (Pl. 11, f. 6) ..... COCHLESPIRINAE

AGATHOTOMA Cossmann, 1899 (p. 1) Nom. nov. for *Ditoma* Bellardi, 1877, non Illiger, 1807. Type (monotypy) : *Mangilia angusta* Jan. Miocene & Pliocene, Europe. Figd. Cossmann 1896 (Pl. 7, figs. 29, 30) .... MANGELIINAE

AGLADRILLIA Woodring, 1928 (p. 157) Type (o.d.) : *A. callothyra* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 5, f. 7) .... CLAVINAE

ALICEIA Dautzenberg & Fischer, 1897 (p. 182) Type (monotypy) : *A. aenigmatica* D. & F. Recent, Azores. Figd. Dautzenberg 1927 (Pl. 3, figs. 24-27). A nepionic shell, perhaps of *Clavatula*, according to Dall 1918, p. 322. Suggested relationship with *Tylotia* according to Clench & Aguayo, 1939, p. 196.

AMBLYACRUM Cossmann, 1889 (p. 291) Type (o.d.) : *Pl. rugosa* Deshayes. Middle Eocene, Paris Basin. Figd. Cossmann 1896 (Pl. 6, figs. 31, 32) .... MANGELIINAE

ANACITHARA Hedley, 1922 (p. 300) Type (o.d.) : *Mangilia naufraga* Hedley. Recent, Queensland. Figd. Hedley 1909 (Pl. 44, f. 93) .... MANGELIINAE

ANCISTROSYRINX Dall, 1881 (p. 53) Type (o.d.) : *A. elegans* Dall. Recent, Florida Reefs and 805 fath., West Indies. Figd. Dall 1889 (Pl. 38, f. 3) .... COCHLESPIRINAE

(**ANDICULA** Olsson, 1929) (p. 1) Type (o.d.) : *Surcula occidentalis* Woods. Eocene, N.W. Peru. Figd. Olsson 1929 (Pl. 16, figs. 7-10) .... SPEIGHTIIDAE

(ANNA Risso, 1826) Non Amalitsky, 1922, non Malloch, 1926. Not a Turrid; ascribed to *Cantharus* by Dall 1918, p. 322.

ANTICLINURA Thiele, 1934 (p. 1002) Nom. nov. for *Clinuropsis* Thiele, 1929, non Vincent, 1913. Type (o.d.) : *Clinura monochorda* Dall. Recent, Gulf of Panama, 1,020 fath. Figd. Dall 1908 (Pl. 13, f. 1) .... ? Subfamily

ANTIMITRA Iredale, 1917 (p. 329) Type (o.d.) : *Pleurotoma aegrota* Reeve. Recent, Singapore, 7 fath. Figd. Reeve 1845 (Pl. 31, f. 276) .... ? BORSONIINAE

ANTIPLANES Dall, 1902 (p. 513) Type (o.d.) : *Surcula perversa* Gabb. Post-Pliocene to Recent, California. Figd. Grant & Gale 1931 (Pl. 26, figs. 22, 23) .... ? Subfamily

APATURRIS Iredale, 1917 (p. 329) Type (monotypy) : *Mitramorpha expeditionis* Oliver. Recent, Kermadec Is., 10-30 metres. Figd. Oliver 1915 (Pl. 11, f. 36) .... BORSONIINAE

APHANITOMA Bellardi, 1875 (p. 241) Type (here designated) : *Turbinella labellum* Bellardi. (Helvetian) Miocene of Turin, Italy. Figd. Cossmann 1896 (Pl. 6, f. 4). Not *Aphanitoma* of Cossmann, 1883. Near *Mitrithara* .... BORSONIINAE

APIOTOMA Cossmann 1889 (p. 263) Type (o.d.) : *Pleurotoma pirulata* Deshayes. Eocene, Paris Basin. Figd. Cossmann 1896 (Pl. 5, figs. 7, 8) .... TURRICULINAE

ASPERDAPHNE Hedley, 1922 (p. 338) Nom. nov. for *Scabrella* Hedley, 1918, non Sacco, 1890. Type (o.d.) : *Daphnella versivestita* Hedley. Recent, N.S.W., Australia. Figd. Hedley 1912 (Pl. 43, f. 33) .... DAPHNELLINAE

ASTHENOTOMA Harris & Burrows, 1891 (p. 97). Nom. nov. for *Oligotoma* Bellardi, 1875, non Westwood, 1836. Type (monotypy) : *Pl. meneghinii* Mayer = *tuberculata* Pusch. Miocene, Italy. Figd. Bellardi 1878 (Pl. 7, f. 26). Type not *Pl. basteroti* Desmoulins, 1842, as usually cited. See Woodring, 1928, p. 197 .... CLAVINAE

ATOMA Bellardi, 1875. Non Latreille, 1817. See *Enatoma* Rovereto, 1899.

AUSTRODRILLIA Hedley, 1918 (p. M79). Type (o.d) : *Pleurotoma angasi* Crosse. Recent, N.S.W., Australia. Figd. Hedley 1922 (Pl. 44, f. 38) .... CLAVINAE

AUSTROTOMA Finlay, 1924 (p. 515). Type (o.d.) : *Bathytoma excavata* Suter. (Hutchinsonian) Lower Miocene, N.Z. Figd. Suter 1917 (Pl. 6, figs. 17, 18) .... CONORBIINAE

AWATERIA Suter, 1917 (p. 57). Type (o.d.) : *A. streptophora* Suter. (Waitotaran) Lower Pliocene, N.Z. Figd. Suter 1917 (Pl. 12, f. 19) .... BORSONIINAE

BACTROCYTHARA Woodring, 1928 (p. 174). Type (o.d.) : *Cythara obtusa* Guppy. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 6, figs. 15, 16) .... MANGELIINAE

BATHYBELA Kobelt, 1905 (p. 276). Type (see Dall, 1918, p. 322) : *Thesbia nudator* Locard. Recent, Europe. Figd.? Listed under *Lora* by Thiele 1929, p. 364. (Not seen.)

BATHYCLIONELLA Kobelt, 1905 (p. 279). Type (monotypy) : *Pl. quadruplex* Watson. Recent, 1,000 fath. off Azores. Figd. Dautzenberg 1927 (Pl. 2, figs. 8, 9) .... ? Subfamily

BATHYTOMA Harris & Burrows, 1891 (p. 113). Nom. nov. for *Dolichotoma* Bellardi, 1875, non Hope, 1839. Type (monotypy) : *Pleurotoma cataphracta* Brocchi. Pliocene, N. Italy. Figd. Cossmann 1896 (Pl. 6, f. 19) .... TURRINAE

BEISSELIA Holzapfel, 1889 (p. 257). Nom. nov. for *Koenenia* Holzapfel, 1888, non Beushausen, 1884, non Grassi, 1885. Type (monotypy : *Koenenia speciosa* Holzapfel. (Senonian Upper Cretaceous, Aix la Chapelle, France. Figd. Cossmann 1896 (Pl. 7, figs. 15, 19) .... ? Subfamily

BELA Gray, 1847a (p. 276). Type (s.d. Gray 1847, p. 134) : *Murex nebula* Montagu. Recent, Europe. Figd. Forbes & Hanley 1851 (Pl. 114, figs. 7-9). This is the correct genus for *Mangilia* auct. non *Mangelia* Risso, 1826. For *Bela* auct. non Gray, 1847, see *Oenopota* MANGELIINAE

BELLARDIA Bucquoy, Dautzenberg & Dollfus, 1883 p. 88) non Robineau-Desvoidy, 1863, non Mayer, 1870. See *Bellardiella, Bellatula* and *Comarmondia.*

BELLARDIELLA Fischer, (Dec.) 1883 (p. 594). Nom. nov. for *Bellardia* Buc. Dautz. & Dollf., 1883, non *Bellardiella* Tapparone-Canefri (July) 1883. *Comarmondia* Monterosato, 1884, to be used.

BELLASPIRA Conrad, 1868 (p. 133). Type (monotypy) : *Mangelia virginiana* Conrad. (Yorktown) Upper Miocene, Virginia. Figd. Bartsch & Rehder 1939 (Pl. 17, f. 6) .... MANGELIINAE

BELLATULA Strand, 1928 (p. 39). Nom. nov. for *Bellardiella* Fischer, 1883 (Dec.), non Tapparone-Canefri, 1883 (July). See *Comarmondia.*

BELOMITRA Fischer, 1882 (p. 592). Type (monotypy) : *B. paradoxa* Fischer. Recent, 627 metres, Atlantic. Figd.? .... ? Subfamily

BELOPHOS Cossmann, 1901 (p. 162). Type (o.d.) : *Bela woodsi* Tate. (Janjukian) Lower Miocene, Tasmania. Figd. Cossmann 1901 (Pl. 6, figs. 9, 10) .... CONORBIINAE

BENTHOFASCIS Iredale, 1936 (p. 319). Type (o.d.) : *Bathytoma sarcinula* Hedley. Recent, N.S.W., Australia. Figd. Hedley 1922 (p. 357, f. 15)............................... DAPHNELLINAE

BENTHOMANGELIA Thiele, 1925 (p. 224). Type (monotypy) : *Surcula trophonoidea* Schepman. Recent, Malay Archipelago. Figd. Thiele 1925 (Pl. 27, f. 24) .... ? Subfamily

BORSONELLA Dall, 1908 (p. 258). Type (o.d.) : *Borsonia dalli* Arnold. Pliocene-Recent, California. Figd. Oldroyd 1927 (Pl. 6, f. 8)................................ BORSONIINAE

BORSONIA Bellardi, 1839 (p. 30). Type (monotypy) : *B. prima* Bellardi. (Helvetian) Miocene, Turin, Italy. Figd. Cossmann 1896 (Pl. 6, figs. 18, 20) .... BORSONIINAE

BRACHYCYTHARA Woodring, 1928 (p. 175). Type (o.d.) : *Cythara gibba* Guppy. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 6, f. 18) .... MANGELIINAE

BRACHYTOMA Swainson, 1840 (pp. 154, 314). Type (s.d. Herrmannsen, 1846, p. 121) : *Pl. strombiformis* Sowerby. Recent, Bay of Panama. Figd. Sowerby 1842 (f. 381) ...... CLAVINAE

BREPHODRILLIA Pilsbry & Lowe, 1932 (p. 47). Type (o.d.) : *B. perfectus* P. & L. Recent, W. Mexico, 20 fath. Figd. Pilsbry & Lowe 1932 (Pl. 2, figs. 7, 8 & text fig. 1, p. 47) .... CLAVINAE

BUCHEMA Corea, 1934 (p. 1). Type (o.d.) : *B. tainoa* Corea. Recent, Puerto Rican Deep. Figd. Corea 1934. As subgenus of *Carinodrillia* .... CLAVINAE

BUCHOZIA Bayan, 1873 (p. 113). Nom. nov. for *Etallonia* Deshayes, 1862, non Oppel, 1861. Type (s.d. Dall, 1918, p. 326, not p. 323) : *E. prisca* Deshayes. Palaeocene, France.

CACODAPHNELLA Pilsbry & Lowe, 1932 (p. 58). Type (o.d.) : *C. delgada* P. &. L. Recent, Nicaragua. Figd. Pilsbry & Lowe 1932 (Pl. 4, f. 8) .... DAPHNELLINAE

(CALLIOTECTUM Dall, 1889). Type (o.d.) : *C. vernicosum* Dall. Referred to *Volutidae* on evidence of the radula by Dall 1918, p. 321.

CALVATULA Preston, 1912. Zool. Rec. 49, Moll. p. 61. Typ. error for *Clavatula.*

CAMPYLACRUM Finlay & Marwick, 1937 (p. 86). Type (o.d.) : *C. sanum* F. & M. (Wangaloan) Upper Cretaceous, N.Z. Figd. Finlay & Marwick 1937 (Pl. 12, figs. 3, 4) .... TURRINAE

CANDELABRUM Dall, 1878, non Blainville, 1830. See *Ancistrosyrinx.*

CARINAPEX Dall, 1924 (p. 88). Type (o.d.) : *Drillia minutissima* Garrett, 1873. Recent, Hawaii (type "Viti Is."). Figd. Tryon 1884 (Pl. 12, f. 29). Proposed as subgenus of *Daphnobela* Cossmann.

CARINODRILLIA Dall, 1919 (p. 17). Type (o.d.) : *Clathrodrillia (C.) halis* Dall. Recent, Lower California. Figd. Dall 1919 (Pl. 5, f. 4) .... CLAVINAE

CATENOTOMA Cossmann & Pissaro, 1900 (p. 39). Type (o.d.) : *Surcula catenata* Lamk. Eocene, Paris Basin. Figd. Cossmann & Pissaro 1900 (Pl. 3, figs. 11, 12) .... TURRICULINAE

CERITOTURRIS Dall, 1924 (p. 88). Type (o.d.) : *C. bittium* Dall. Recent, Hawaiian Is. Unfigured, proposed as a subgenus of *Crassispira.*

CERODRILLIA Bartsch & Rehder, 1939 (p. 127). Type (o.d.) : *C. clappi* B. & R. Recent, Florida. Figd. Bartsch & Rehder 1939 (Pl. 17, f. 4) .... CLAVINAE

(CHAUVETIA Monterosato, 1884) (p. 137). Nom. nov. for *Nesaea* Risso, 1826 non Leach, 1814. A cancellate *Anachis* according to Dall 1918, p. 323. See also Grant & Gale, 1931, p. 686. *Pyrenidae.*

CIRILLIA Monterosato, 1884 (p. 133). Type (by virtual tautonomy, see Grant & Gale 1931, p. 609) : *Pl. linearis* Montagu. Recent, Mediterranean to Britain. Figd. Forbes & Hanley 1851 (Pl. 114, figs. 1-3). Non *Cirillia* Rondani, 1856. Probably equals *Philbertia.*

CLAMTURRIS Iredale, 1931 (p. 226). Type (o.d.) : *C. incredula* Iredale. Recent, N.S.W., Australia. Figd. Iredale 1931 (Pl. 25, f. 21) .... TURRINAE

CLATHRODRILLIA Dall, 1918a (p. 317). Type (o.d.) : *Pleurotoma gibbosa* Reeve = *P. gibbosa* Kiener. Recent, Indian Ocean? Figd. Kiener 1839-40 (Pl. 16, f. 2) .... CLAVINAE

CLATHROMANGELIA Monterosato, 1884 (p. 131). Type (monotypy) : *Pleurotoma granum* Philippi. Recent, Mediterranean. Figd. Thiele 1929 (p. 369, f. 455) .... MANGELIINAE

CLATHURELLA Carpenter, 1857 (p. 399). Nom. nov. for *Defrancia* Millet, 1827, non Bronn, 1825. Type (s.d. Dall 1908, p. 260) : *Defrancia pagoda* Millet, 1827. (Helvetian) Miocene, Turin, Italy. See *Pleurotomoides* Bronn, 1831.

Grant & Gale (1931, p. 604) and Pilsbry & Lowe (1932, p. 55) endeavoured to preserve *Clathurella* on the basis of Cossmann's designation (1896, p. 121) of the Recent *Clavatula rava* Hinds. As *Defrancia* was proposed without a designated type, then *Clathurella*, published as a substitute name for Millet's *Defrancia*, must take its type from among the five original species mentioned by Millet, notwithstanding the fact that Carpenter included other species in proposing his substitute name. As Carpenter did not designate a type then his nom. nov. has to be treated strictly as such. Cossmann's designation is invalid because *rava* was one of Carpenter's inclusions, not in Millet's list.

CLATHURINA Melvill, 1917 (p. 185). Type (o.d.) : *Pleurotoma foraminata* Reeve. Recent, Indian Ocean. Figd. Reeve 1845 (pl. 33, f. 301). Proposed as a "Nom. nov. for *Clathurella* Carpenter, 1857, and *Defrancia* Millet, 1826," but the added type designation makes *Clathurina* a new proposition—i.e., Nom. nov. for *Clathurella* auct. and *Defrancia* auct., but not of Carpenter, 1857, or Millet, 1827 .... DAPHNELLINAE

CLAVATULA Lamarck, 1801 (p. 84). Type (monotypy) : *C. coronata* Lamarck. Recent, West Africa. Figd. Grant & Gale 1931 (Pl. 25, figs. 16a, 16b) .... CLAVATULINAE

CLAVICANTHA Swainson, 1840 (pp. 155, 314). Type (s.d. Herrmannsen, 1846) : *Pleurotoma echinata* Lamk. Recent, West Africa. Figd. Kiener 1839-40 (Pl. 20, f. 2). A synonym of *Clavus* Montfort, 1810.

CLAVOSURCULA Schepman, 1913 (p. 429). Type (o.d.) : *C. sibogae* Schep. Recent, Flores Sea, East Indies. Figd.? Resembles *Steiraxis* according to Dall 1918, p. 324 .... ? Subfamily

CLAVUS Montfort, 1810 (p. 434). Type (o.d.) : *C. flammulatus* Montfort. Recent, West Africa. Figd. Montfort 1810, p. 434. See Hedley 1924, pp. 254-257, and Woodring 1928, p. 160 .... CLAVINAE

CLINURA Bellardi, 1875 (p. 20). Type (s.d. Bellardi 1878, p. 204) : *Murex (Pleurotoma) calliope* Brocchi. Miocene, Italy. Figd. Cossmann 1896 (Pl. 5, f. 19). Closely related to *Turricula* according to Grant & Gale, 1931, p. 494 .... ? Subfamily

CLINUROPSIS Vincent, 1913 (p. ?). Type (monotypy) : *C. diderrichi* Vincent. Paleocene or Basal Eocene, Belgian Congo. (Paper not seen.) Opinions given by Cossmann 1913, p. 229. and Gardner 1931, p. 157.

CLINUROPSIS Thiele, 1929 (p. 372). Type (o.d.) : *P. monochorda* Dall. As sect. of *Pleurotomella.* Non. *Clinuropsis* Vincent, 1913. See *Anticlinura* Thiele, 1934.

CLIONELLA Gray, 1847 (p 153). Type (o.d.) : *Buccinum sinuatum* Born. Recent, South Africa. Figd. Tryon 1884 (Pl. 9, f. 50) .... CLAVATULINAE

COCHLESPIRA Conrad, 1865 (p. 19). Type (s.d. Cossmann 1896, p. 68) : *Pleurotoma engonata* Conrad. Figd. Cossmann 1906 (Pl. 14, f. 13) (Claibornian) Middle Eocene, Texas. See Woodring 1928, p. 164, also Harris 1937, p. 44, for contrary opinion; here considered unacceptable .... COCHLESPIRINAE

COCHLESPIRELLA Casey, 1903 (p. 279). Type (o.d.) : *Fusus nanus* Lea. (Claibornian) Middle Eocene, Alabama, U.S.A. Status uncertain. Figd. Lea, 1833 (Pl. 5, f. 155).

COCHLESPIROPSIS Casey, 1904 (p. 143). Type (s.d. Cossmann 1906, p. 221) : *Pleurotoma engonata* Conrad. A perfect synonym of *Cochlespira.*

(**COCHLIOCONUS** Yokoyama, 1928) (p. 338). Type (monotypy) : *C. gradatus* Yok. Pliocene, Japan. Figd. Yokoyama 1928 (Pl. 66, figs, 3, 4) .... THATCHERIIDAE

(**COLUMBARIUM** von Martens, 1881). Not a Turrid : *Columbariidae;* see Peile 1922, p. 13.

COMARMONDIA Monterosato, 1884 (p. 135). Nom. nov. for *Bellardia* Buc. Dautz & Dollf., 1883. Non Robineau-Desvoidy 1863, etc. Type (monotypy) : *Murex gracilis* Montagu. Recent, Europe. Figd. Forbes & Hanley 1851 (Pl. 114, f. 4). See Woodring 1928, p. 188. . MANGELIINAE

COMITAS Finlay, 1926 (p. 251). Type (o.d.) : *Surcula oamarutica* Suter (= *Drillia fusiformis* Hutton). (Awamoan) Middle Miocene, N.Z. Figd. Suter 1917 (Pl. 6, figs. 9, 10) TURRICULINAE

COMPSODRILLIA Woodring, 1928 (p. 155). Type (o.d.) : *C. urceola* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 5, figs. 1, 2) .... CLAVINAE

CONOPLEURA Hinds, 1884 (p. 24). Type (monotypy) : *C. striata* Hinds. Recent, New Guinea, 7 fath. Figd. Tryon 1884 (Pl. 8, figs. 6, 7) .... MANGELIINAE

CONORBIS Swainson, 1840 (p. 312). Type (monotypy) : *Conus dormitor* Sowerby. (Bartonian) Upper Eocene, England. Figd. Cossmann 1896 (Pl. 8, figs. 16, 18) .... CONORBIINAE

CORBULOSPIRA Vincent, 1913 (p. ?). Type (monotypy ?) : *Surcula (C.) diderrichi* Vincent. Paleocene or Basal Eocene. Belgian Congo. Opinions given by Cossmann 1913, p. 229, and Gardner 1931, p. 157. (Not seen.)

CORDIERIA Rouault, 1848 (p. 207). Type (s.d. Cossmann 1896, p. 98) : *C. iberica* Rouault. Eocene, Paris Basin. Figd.? Tryon's 1883 citation, quoted by Dall (1918, p. 324) of *Pl. pyrenaica* Rouault is not a designation .... BORSONIINAE

CORDIERIA Monterosato, 1884 (p. 131). Non Rouault 1848. Type (tautonomy) : *Pl. cordieri* Payraudeau. Recent Corsica. Figd. Kiener 1839-40 (Pl. 24, fig. 1). A synonym of *Philbertia.*

CORONIA Gregorio, 1890 (p. 23). Type (o.d.) : *Pleurotoma acutirostra* Conrad. (Claibornian) Middle Eocene, U.S.A. Figd. Harris 1937 (Pl. 1, f. 22). A synonym of *Hemipleurotoma* according to Grant & Gale 1931, p. 570, and of *Gemmula* according to Harris 1937, p. 11. Non *Coronia* Ehrenberg, 1840 (see Dall, 1918, p. 324). .... TURRINAE

COSMASYRINX Marwick, 1931 (p. 138). Type (o.d.) : *C. monilifera* Marwick (Hutchinsonian) Lower Miocene, N.Z. Figd. Marwick 1931 (Pl. 16, f. 292) .... COCHLESPIRINAE

CRASSISPIRA Swainson, 1840 (pp. 152, 313). Type (s.d. Herrmannsen 1847, p. 318). The type of this genus is in doubt. Herrmannsen designated *Pleurotoma bottae* Valenciennes (in Kiener 1839-40), but Swainson's two cited species were "*Pleurotoma bottae* Auct. and *C. fasciata* Sw." One view is that because Swainson did not quote *bottae* as of Valenciennes, then *bottae* Auct. in Swainson is a nude name, leaving *fasciata* Swainson as type by monotypy. This latter species, however, has not been identified with certainty, although personally I agree with Grant & Gale 1931, p. 581, that it is of the same group as *bottae* Valenciennes. In fact, Swainson's figure (p. 151, f. 17d.) suggests a close ally to *C. pluto* Pilsbry & Lowe, 1932 (Pl. 2, f. 12). Both Woodring 1928, pp. 147-148, and Grant & Gale 1931, pp. 580-581, favour the acceptance of Herrmannsen's designation. . CLAVINAE

CRASSISPIRELLA Bartsch & Rehder, 1939 (p. 135). Type (o.d.) : *Turris rugitecta* Dall. Recent, Lower California. Figd. Dall 1919 (Pl. 7, f. 6) .... CLAVINAE

CRASSOPLEURA Monterosato, 1884 (p. 127). Type (monotypy) : *Pl. maravignae* Bivona. Recent, Mediterranean. Figd. Tryon 1884 (Pl. 8, fig. 12) .... CLAVINAE

CRENATURRICULA Vokes, 1939 (p. 114). Type (o.d.) : *Surcula crenatospira* Cooper. (Capay) Eocene, California. Figd. Vokes 1939 (Pl. 17, figs. 4, 5) .... TURRICULINAE

CROSSOPLEURA Monterosato, 1890. Type error for *Crassopleura.*

CRYOTURRIS Woodring, 1928 (p. 178). Type (o.d.) : *C. cugonia* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 7, f. 4) .... MANGELIINAE

CRYPTOCONUS v. Koenen, 1867 (p. 211). Type (s.d. Cossmann, 1889, p. 235) : *Pleurotoma filosa* Lamarck. Eocene, Paris Basin. Figd. Cossmann 1896 (Pl. 7, figs. 20, 21) ...... CONORBIINAE

CRYPTOGEMMA Dall, 1918a (p. 318). Type (o.d.) : *Gemmula benthina* Dall, 1908. Gulf of Panama to Ecuador, 812-1,360 fath. Figd. Dall 1908 (Pl. 13, f. 4). Proposed as subgenus of *Gemmula* for deep-water thin-shelled species with greenish periostracum. (Synonym of *Hemipleurotoma* according to Grant & Gale, 1931, p. 570) .... TURRINAE

CRYPTOMELLA Finlay, 1924 (p. 516). Type (o.d.) : *Leucosyrinx alta transenna* Suter. (Awamoan) Middle Miocene, N.Z. Figd. Marshall & Murdoch 1923 (Pl. 12, f. 1) = *Tomopleura* Casey, 1904 .... CLAVINAE

CRYPTOMITRA Dall, 1924 (p. 89). Type (o.d.) : *Pleurotomella climacella* Dall. Recent, 351 fath. off Hawaiian Is. Figd. Dall 1895 (Pl. 31, f. 14). (A synonym of *Bathyclionella* Kobelt according to Thiele 1929, p. 367.)

CYMATOSYRINX Dall, 1889a (p. 95). Type (o.d.) : *Pleurotoma lunata* Lea. Miocene, Virginia, U.S.A. Figd. Grant & Gale 1931 (Pl. 26, f. 7) .... CLAVINAE

CYTHARA Schumacher, 1817 (p. 245). Type (monotypy) : *C. striata* Schum. Rejected as a *nomen dubium*, and *Cythara* auct. replaced by *Eucithara* Fischer, 1883. See Hedley 1922,, pp. 260-261, and for non acceptance of Hedley's proposal, Grant & Gale 1931, p. 602.

CYTHARELLA Monterosato, 1875 (p. 75) *(Cyharella*, typ. error). Type (s.d. Woodring 1928, p. 168) : *Murex costatus* Donovan. Recent, Europe. Figd. Forbes & Hanley 1851 (Pl. 114a, figs. 3 & 4). Dall's 1918 (p. 325) designation of *Pleurotoma bertrandi* Payraudeau considered invalid by Woodring 1928, p. 168 .... MANGELIINAE

CYTHAROPSIS A. Adams, 1865 (p. 323). Type (monotypy) : *Mangilia cancellata* A. Adams. Recent, Japan. Unfigured. Non *Citharopsis* Pease, 1868, which is a Pyrenid .... ? Subfamily

DAPHNELLA Hinds, 1844 (p. 25). Type (s.d. Herrmannsen 1847, p. 370) : *Pleurotoma lymneiformis* Kiener. Recent, "Indian Ocean and Ile de France." Non *Daphnella* Baird, 1850. Figd. Kiener 1839-40 (Pl. 22, f. 3) .... DAPHNELLINAE

(**DAPHNELLOPSIS** Schepman, 1913) (p. 449). Type (o.d.) : *D. lamellosa* Schepman. Recent, Savu Sea, East Indies. Referred near *Maculotriton* by Iredale 1918, Pro. Mal. Soc. 13, p. 33.

(**DAPHNOBELA** Cossmann, 1896) (p. 93). Type (o.d.) : *Buccinum junceum* Sowerby. (Bartonian) Upper Eocene, England. Figd. Cossmann, 1896 (Pl. 5, figs. 30, 31). Referred to *Pyrenidae* by Woodring 1928, p. 287.

DARBYA Bartsch, 1934 (p. 22). Type (o.d.) : *D. lira* Bartsch. Recent, Puerto Rican Deep. Figd. Bartsch 1934 (Pl. 7, figs. 6, 8).

DEFRANCIA Millet, 1826 (p. 437). Non Bronn 1825. See *Pleurotomoides* Bronn 1831, and *Clathurella* Carpenter, 1857.

DIAUGASMA Melvill, 1917 (p. 195). Type (o.d.) : *Daphnella epicharta* Melvill & Standen. Recent, Gulf of Oman, 156 fath. Figd. Melvill & Standen 1903 (Pl. 23, f. 10) ... DAPHNELLINAE

"DIPLOCONUS Sandberger. Non Haeckel, 1860, non Candèze, 1860, non Zittel, 1868." See Dall, 1918, p. 325. I have failed to trace any other reference to "*Diploconus* Sandberger." Neave 1939 does not list it.

DITOMA Bellardi, 1878. Non Illiger, 1807. (See *Agathotoma*.)

DOLICHOTOMA Bellardi, 1875. Non Hope 1839. (See *Bathytoma*.)

DOLIGOTOMA Weinkauff, 1876. Typ. error for *Dolichotoma* Bellardi.

DOMENGINELLA Vokes, 1939 (p. 121). Type (o.d.) : *Turris claytonensis* Gabb. (Domengine) Eocene, California. Figd. Vokes 1939 (Pl. 17, figs. 18, 20) .... ? Subfamily

(DONOVANIA Bucquoy Dautzenberg & Dollfus, 1883) (p. 112). Type (o.d.) : *D. minima* Montagu = *brunneum* Donovan 1804. Non *Donovania* Leach 1814. Removed from *Turridae* by Iredale 1918, p. 34.

DOUGLASSIA Bartsch, 1934 (p. 5). Type (o.d.) : *D. enae* Bartsch. Recent, W. C. Florida. Non Chambers, 1881, "*Douglassia*" err. for *Douglasia* Stainton, 1854. Figd. Bartsch 1934 (Pl. 2, figs. 1-3).

DRILLIA Gray, 1838 (p. 28). Type (s.d. Gray 1847, p. 134) : *D. umbilicata* Gray. Recent, West Africa. Figd. Thiele 1929 (figs. 432, 433, p. 357) .... CLAVINAE

DRILLIOLA (Monterosato mss.) Cossmann, 1903 (p. 188). Type (o.d.) : *D. emendata* Monterosato. Recent, Sicily 100-300 metres. Figd. Tryon, 1884 (Pl. 4, f. 47) .... CLAVINAE

ELAEOCYMA Dall, 1918a (p. 317). Type (o.d.) : *Drillia empyrosia* Dall. Recent, Southern California. Figd. Dall 1919 (Pl. 4, f. 1). (Considered a synonym of *Cymatosyrinx* by Grant & Gale 1931, p. 575) .... CLAVINAE

ELDRIDGEA Bartsch, 1934 (p. 2). Type (o.d.) : *E. johnsoni* Bartsch. Recent, N. Coast Puerto Rico. Figd. Bartsch 1934 (Pl. 1, figs. 1-3) = *Tylotia* Clench and Aguayo 1939, p. 196..CLAVINAE

ENATOMA Rovereto, 1899. Nom. nov. for *Atoma* Bellardi, 1875, non Latreille, 1817. Type (monotypy) : *A. hypothetica* Bellardi. (Helvetian) Miocene, Turin, Italy. Figd. Cossmann 1896 (Pl. 7, f. 17) .... MANGELIINAE

ENDIATOMA Cossmann, 1896 (p. 106). Type (o.d.) : *Oligotoma quadricincta* Cossmann = *Aphanitoma* Cossmann, 1883, non Bellardi, 1875. Eocene, Paris Basin. Figd. Cossmann 1896 (Pl. 6, f. 30) .... CLAVINAE

EOCLATHURELLA Casey, 1904 (p. 166). Type (s.d. Harris 1937, p. 76) : *E. jacksonica* Casey. (Claibornian) Middle Eocene. Figd. Harris 1937 (Pl. 13, f. 13).

EODRILLIA Casey, 1904 (p. 159). Type (s.d. Cossmann 1904, p. 237) : *Pleurotoma depygis* Conrad. (Claibornian) Middle Eocene, U.S.A. Figd. Cossmann 1906 (Pl. 14, f. 16) (= *Eopleurotoma* according to Cossmann 1906, p. 223).

EOPLEUROTOMA Cossmann, 1889 (p. 269). Type (o.d.) : *Pleurotoma multicostata* Deshayes. Eocene, Paris Basin. Figd. Cossmann & Pissaro 1910-1913 (Pl. 51, figs. 224-16) .... TURRINAE

EOSURCULA Casey, 1904 (p. 145). Type (s.d. Vokes 1939, p. 118) : *Pleurotoma moorei* Gabb. Eocene, Texas. Figd. Cossmann 1906 (Pl. 14, f. 21) .... TURRICULINAE

EOTHESBIA Finlay & Marwick, 1937 (p. 88). Type (o.d.) : *E. microtomoides* F. & M. (Wangaloan) Upper Cretaceous, N.Z. Figd. Finlay & Marwick 1937 (Pl. 12, figs. 5, 8) .. BORSONIINAE

EOTURRIS Finlay & Marwick, 1937 (p. 114). Type (o.d.) : *Turris complicatus* Suter. (Tahuian) Upper Eocene, N.Z. Figd. Suter (Pl. 5, f. 14, also Pl. 6, f. 8 as *mordax*, also Pl. 6, f. 3, as *uttleyi*) .... TURRINAE

EPALXIS Cossmann, 1889 (p. 254). Type (o.d.) : *Pleurotoma crenulata* Lamk. Eocene, Paris Basin. Figd. Cossmann & Pissaro 1910-1913 (Pl. 50, figs. 221-2). .... TURRINAE

EPIDEIRA Hedley, 1918 (p. M79). Type (o.d.) : *Clavatula striata* Gray. (Not *E. striata* of Hedley 1922, Pl. 43, f. 18.) See Iredale 1931, p. 225 .... TURRINAE

EPIDIRELLA Iredale, 1931 (p. 226). Type (o.d.) : *Hemipleurotoma tasmanica* May. Recent, Tasmania. Figd. May 1911 (Pl. 13, f. 16) .... TURRINAE

EPIDIRONA Iredale, 1931 (p. 225). Type (o.d.) : *E. hedleyi* Iredale. Recent, N.S.W. Figd. Hedley 1922 (Pl. 43, f. 18, as *E. striata*). .... TURRINAE

ETALLONIA Deshayes, 1862. Non *Etallonia* Oppel, 1861. See *Buchozia*.

ETREMA Hedley, 1918 (p. M79). Type (o.d.) : *Mangilia (Glyphostoma) aliciae* Melvill & Standen. Recent, Loyalty Is. Figd. Hedley, 1922 (Pl. 47 f. 70) .... MANGELIINAE

ETREMELLA Makiyama, 1927 (p. 112). Type (o.d.) : *Cytharella totomiensis* Makiy. (Dainiti series) Lower Pliocene, Japan. Figd. Makiyama 1927 (Pl. 5, f. 6) .... MANGELIINAE

EUBELA Dall, 1889a (p. 106). Type (o.d.) : *Pleurotoma (Bela) limacina* Dall. Recent, West Atlantic. Figd. Dall 1889 (Pl. 9, f. 10) .... DAPHNELLINAE

EUCHEILODON Gabb. 1860 (p. 379). Type (monotypy) : *E. reticulata* Gabb. (Lr. Claibornian) Eocene, Texas. Figd. Harris 1937 (Pl. 4, figs. 3, 3a)

EUCITHARA Fischer, 1883 (p. 593). Type (monotypy) : *Mangelia stromboides* Reeve. Recent, Philippines. Figd. Tryon 1884 (Pl. 23, f. 1) .... MANGELIINAE

EUCLATHURELLA Woodring, 1928 (p. 187). Type (o.d.) : *Clathurella vendryesiana* Dall. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 8, f. 1) .... MANGELIINAE

EUCYCLOTOMA Boettger, 1895 (p. 55). Type (s.d. Cossmann, 1896, p. 63) : *Clathurella bicarinata* "Reeve" Pease. Recent, Kingsmill Is., Indo-Pacific. Figd. Tryon 1884 (Pl. 17, f. 90) DAPHNELLINAE

EUDAPHNE Bartsch, 1931 (p. 3). Non Reuss, 1922. See *Eudaphnella*.

EUDAPHNELLA Bartsch, 1933 (p. 76). Nom nov. for *Eudaphne* Bartsch, 1931 non. Reuss, 1922. Type (o.d.) : *E. allemani* Bartsch. Figd. Bartsch 1931 (Pl. 1, f. 3).

EUGEMMULA Iredale, 1931 (p. 226). Type (o.d.) : *E. hawleyi* Iredale. Recent, N.S.W. Figd. Iredale 1931 (Pl. 25, figs. 11, 14) (= *Gemmula*). Iredale stated that *Eugemmula* has a different apex and a longer canal than the West American *Gemmula gemmata* and that he had a recollection that *Gemmula* was invalid. Sherborne (p. 453) gives one year priority for *Gemmula* Weinkauff, 1875, over *Gemmula* Seguenza, 1876. Tryon (1884, p. 173) considers the true locality of *gemmata* to be Indo-Pacific. At present, I cannot see any reason for maintaining *Eugemmula*, the canal appears equally long in both genotypes and differentiating nuclear details are not given.

EUMETADRILLIA Woodring, 1928 (p. 159). Subg. of *Agladrillia.* Type (o.d.) : *A. (E.) serra* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 5, f. 9) .... CLAVINAE

EURYENTMEMA Woodring, 1928 (p. 195). Type (o.d.) : *E. cigclis* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 8, f. 13) .... MANGELIINAE

EXILIA Conrad, 1860 (p. 291). Type (monotypy) : *E. pergracilis* Conrad. Eocene, Alabama. Figd. Conrad 1860 (Pl. 47, f. 34). Not *Fasciolaria pergracilis* Aldrich, 1886. Stewart (1927, p. 419) considers the genotype to be Turrid because of a faint notch in the outer lip, but remarks that the Recent species referred to the genus by Dall may well be Chrysodomoid.

EXOMILUS Hedley, 1918 (p. M79). Type (o.d.) : *Mangelia lutraria* Hedley. Recent, N.S.W. Figd. Hedley, 1907 (Pl. 54, figs. 11, 12) .... DAPHNELLINAE

FAVRIELLA Hornung, 1920 (p. 76). Type (monotypy) : *Daphnella (F.) weberi* Hornung. Pliocene, Italy. Proposed as n. sect. of *Daphnella.* Figd. ? (Not seen.)

FENESTROSYRINX Finlay, 1926 (p. 254). Type (o.d.) : *Turris nexilis bicarinatus* Suter. (Castlecliffian) Upper Pliocene to Recent, N.Z. Figd. Mestayer 1919 (Pl. 8 f. 5, as *Leucosyrinx thomsoni)* .... TURRINAE

FENIMOREA Bartsch, 1934 (p. 3). Type (o.d.) : *F. janetae* Bartsch. Recent, Puerto Rico Deep 33-40 fath. Figd. Bartsch 1934 (Pl. 1, figs. 4-7)

FILODRILLIA Hedley, 1922 (p. 220). Type (o.d.) : *Drillia tricarinata* Ten.-Woods. Recent, N.S.W., Australia. Figd. Hedley 1922 (text fig. 4) .... MANGELIINAE

(FOLINEAEA Monterosato, 1884) (p. 136). Type (virtual tautonomy) : *Buccinum lefebvrii* Maravigna + *"Buccinum" folineae* Philippi. Genus synonymous with *Chauvetia* according to Grant & Gale 1931, p. 686.

FUSISYRINX Bartsch, 1934 (p. 7). Type (o.d.) : *F. fenimorei* Bartsch. Recent, Puerto Rico Deep. Figd. Bartsch 1934 (Pl. 2, figs. 4, 5).

FUSITOMA Casey, 1904 (p. 163). Type (monotypy) : *F. sipho* Casey (ex Aldrich). See Cossmann 1904, p. 223. Position uncertain for want of data,

FUSITURRICULA Woodring, 1928 (p. 165). Type (o.d.): *Turris (Surcula) fusinella* Dall. Recent, Gulf of Panama, 153 fath. Figd. Dall 1908 (Pl. 14, f. 7) .... TURRICULINAE

FUSITURRIS Thiele 1929 (p. 361). Type (o.d.) : *T. (F.) undatiruga* Bivona. Recent, N. & W. Africa. Figd. Tryon 1884 (Pl. 5, f. 71) .... TURRINAE

GEMMULA Weinkauff, 1875 (p. 287). Type (s.d. Cossmann 1896, p. 62) : *Pleurotoma gemmata* Reeve. Recent, "Gulf of Magdalena, California." Locality not confirmed. Tryon (1884, p. 173) considers it to be Indo-Pacific. Figd. Reeve 1843 (Pl. 10, f. 83) & Harris 1937 (Pl. 1, f. 33, a) .... TURRINAE

GENOTA H. & A. Adams 1853 (p. 89) (=*Genotia* Auct.). Type (s.d. Fischer 1883, p. 589) : *Buccinum mitriformis* Wood. Recent, West Africa. Figd. Grant & Gale (1931, Pl. 25, fig. 17) .... CONORBIINAE

GINNANIA Monterosato, 1884 (p. 127). Type (tautonomy) : *Mangilia ginnania* Risso = *M. nebula* Montagu according to Forbes & Hanley 1851, p. 476. A synonym of *Bela.*

GLOBIDRILLIA Woodring, 1928 (p. 163). Type (o.d.) : *G. ula* Woodring. Middle Miocene, Jamaica. Figd. Woodring 928 (Pl. 5, f. 16) .... CLAVINAE

GLYPHOSTOMA Gabb, 1872 (p. 271). Type (monotypy) : *G. dentiferum* Gabb. Miocene, Dominican Republic. Figd. Pilsbry 1922 (Pl. 17, f. 15) .... MANGELIINAE

GLYPHOSTOMOPS Bartsch, 1934 (p. 17). Type (o.d.) : *G. hendersoni* Bartsch. Puerto Rico Deep. Figd. Bartsch 1934 (Pl. 5, figs. 2, 5, 8). (Subgenus of *Glyphostoma.)* .... MANGELIINAE

GLYPHOTURRIS Woodring, 1928 (p. 177). Type (o.d.) : *Mangilia quadrata rugirima* Dall. Recent, Florida. Figd. M. Smith 1937 (Pl. 52, f. 4) .... MANGELIINAE

GLYPTOTOMA Casey, 1904 (p. 140). Type ? (1st species, see Dall, 1918, p. 327) : *Pl. crassiplicata* Gabb. (Lr. Claibornian) Eocene, Texas. Figd. Harris 1937 (Pl. 3, figs. 27-30). A subgenus of *Bathytoma* according to Harris (l.c.) but it has strong pillar plaits ......BORSONIINAE

(**GOSAVIA** Stoliczka, 1866). Volutid placed with *Turridae* by Cossmann, 1896, p. 116. See Dall 1918, p. 327.

GURALEUS Hedley, 1918 (p. M79). Type (o.d.) : *Mangilia picta* Ad. & Ang. Recent, N.S.W., Australia. Figd. Hedley, 1922 (Pl. 53, f. 150) .... MANGELIINAE

GYMNOBELA Verrill, 1884 (p. 157). Type (s.d. Cossmann 1896, p. 63): *G. engonia* Verrill. Recent, Gulf of Maine to Rhode Id., Eastern U.S.A. Not figured .... ? SUBFAMILY

HAEDROPLEURA Bucquoy Dautzenberg & Dollfus, 1883 (p. 110). Type (o.d.) : *Pleurotoma septangularis* Montagu. Recent, Europe. Figd. Thiele, 1929 (P. 362, f. 444). May equal *Bellaspira* according to Woodring 1928, p. 163 .... MANGELIINAE

HELENELLA Casey, 1904 (p. 167). Type (s.d. Dall 1918, p. 327) : *Pl. multigranosa* E. A. Smith. Recent, St. Helena. Recalls *Mitromorpha* according to Dall 1918, p. 327 .... BORSONIINAE

HEMIDAPHNE Hedley, 1918 (p. M79). Type (o.d.) : *Pleurotoma sowerbici* Smith. Recent, Western Australia. Figd. Hedley 1908 (Pl. 8, f. 9) .... DAPHNELLINAE

HEMILIENARDIA Boettger, 1895 (p. 52). Type (o.d.) : *Pleurotoma (Defrancia) malleti* Recluz. Recent, Western Pacific .... MANGELIINAE

HEMIPLEUROTOMA Cossmann, 1899 (p. 264). Type (o.d.) : *Pleurotoma archimedis* Bellardi. (Helvetian) Middle Miocene, Italy. Figd. Grant & Gale 1931 (Pl. 26, f. 36) .... TURRINAE

HEMISURCULA Casey, 1904 (p. 150). Type (o.d.) : *Pleurotoma silicata* Aldrich. (Claibornian) Middle Eocene, Alabama, U.S.A. Figd. Harris 1937 (Pl. 11, f. 22).

HETEROCITHARA Hedley, 1922 (p. 297). Type (o.d.) : *Clathurella bilineata* Angas. Recent, N.S.W., Australia. Figd. Hedley 1922 (Pl. 49, f. 106) .... MANGELIINAE

(**HETEROTERMA** Gabb. 1868). Type (monotypy) : *H. trochoidea* Gabb. (Martinez) Paleocene, California. (Referred to *Turridae* by Stewart 1927, Proc. Acad. Nat. Sci. Phil. vol. 78, p. 423.) (Referred to *Tudiclinae* herein.)

HOMOTOMA Bellardi, 1875 (p. 22) (no type designated) preoccupied by Guèrin-Ménéville, 1844. See *Peratotoma*.

INQUISITOR Hedley, 1918 (p. M79). Type (o.d.) : *Pleurotoma sterrha* Watson. Recent, N. Queensland. Figd. Watson 1886 (Pl. 21, f. 3.) .... CLAVINAE

INSOLENTIA Finlay, 1926 (p. 251). Type (o.d.) : *Surcula parcoraensis* Suter. (Awamoan) Middle Miocene, N.Z. Figd. Suter 1917 (Pl. 6, f. 11, as *obliquecostata* Suter non Martens 1901) TURRICULINAE

IREDALEA Oliver, 1915 (p. 538). Type (o.d.) : *I. subtropicalis* Oliver. Recent, Kermadec Is. 10-30 metres. Figd. Oliver 1915 (Pl. 11, f. 34).

IRENOSYRINX Dall, 1908 (p. 257). Type (o.d.) : *Pl. (Leucosyrinx) goodei* Dall. Recent, 1,050 fath. N.W. of Patagonia. Figd. Dall 1908 (Pl. 19, f. 2). A synonym of *Aforia* according to Grant & Gale 1931, p. 508 .... COCHLESPIRINAE

ISHNULA Gray, 1847 (p. 134). Type (monotypy) : "?*Mangelia* Risso, 1826, f. 130" = *M. menardiana* Risso. Recent, Mediterranean. Figd. Grant & Gale 1931 (Pl. 25, f. 21). Probably a synonym of *Bela*.

ITHYCYTHARA Woodring, 1928 (p. 168). Type (o.d.) : *Mangilia psila* Bush. Recent, S.E. Coast U.S. America. Figd. M. Smith 1937 (Pl. 65, f. 2) .... MANGELIINAE

ITIA Marwick, 1931 (p. 143). Type (o.d.) : *I. clatrata* Marwick. (Hutchinsonian) Lower Miocene, N.Z. Figd. Marwick 1931 (Pl. 12, f. 230) .... BORSONIINAE

(**KENYONIA** Brazier, 1896) (p. 346). Type (monotypy) : *K. pulcherrima* Brazier. Recent, New Hebrides. Not figured; described as resembling *Conus;* listed with *Turridae* by Dall 1918, p. 327; listed with *Conidae* by Tomlin 1937, p. 298.

KERMIA Oliver, 1915 (p. 539). Type (o.d.) : *K. benhami* Oliver. Recent, 10-30 metres Kermadec Islands. Figd. Oliver 1915 (Pl. 11, f. 35) .... DAPHNELLINAE

KNEFASTIA Dall, 1919 (p. 3). Type (o.d.) : *Pleurotoma olivacea* Sowerby. Recent, Panama. Figd. Grant & Gale 1931 (Pl. 25, f. 15) .... CLAVATULINAE

KOENENIA Holzapfel, 1889 (p. 91). Non Grassi 1885, non Beushausen 1884. See *Beisselia*.

KURTZIELLA Dall, 1918 (p. 137). Type (o.d.) : *Pleurotoma cerina* Kurtz & Stimpson. Recent, East Coast U.S. America. Figd. Tryon 1884. (Pl. 22, f. 43) .... MANGELIINAE

KYLIX Dall, 1918 (p. 327). "Type: *K. alcyone* Dall." A nomen nudum; type not described until 1919.

KYLIX Dall, 1919a (p. 20). Type (o.d.) : *K. alcyone* Dall, 1919. Recent, W. Mexico, 76 fath. Figd. Dall 1919 (Pl. 2, f. 3) .... CLAVINAE

LAEVITECTUM Dall, 1919 (p. 19). Type (monotypy) : *Drillia eburnea* Carpenter. Recent, Gulf of California. Figd. Dall 1919 (Pl. 13, f. 5)................................... ? CLAVINAE

LEIOCITHARA Hedley, 1922 (p. 268). Type (o.d.) : *Mangelia infulata* Hedley. Recent, Queensland. Figd. Hedley 1909 (Pl. 44. f. 92) .... MANGELIINAE

LEPTADRILLIA Woodring, 1928 (p. 159). Type (o.d.) : *Turris (Surcula) parkeri* Gabb. Middle Miocene, Dominican Republic. Figd. Woodring 1928 (Pl. 5, f. 10) .... CLAVINAE

LEPTOSURCULA Casey, 1904 (p. 157). Type (o.d.) : *Pl. beadata* Harris. Eocene, Texas. Figd. Harris 1937 (Pl. 13, figs. 30, 31).

LEUCOSYRINX Dall, 1889a (p. 75). Type (o.d.) : *Pl. verrilli* Dall. Recent, North Carolina to Gulf of Mexico 150-860 fath. Figd. Dall 1889 (Pl. 10, f. 5) .... COCHLESPIRINAE

LEUFROYIA Monterosato, 1884 (p. 134). Type (tautonomy) : *Pleurotoma leufroyi* Michaud. Recent, Europe. Synonym of *Philbertia,* according to Woodring 1928, p. 188. Figd. Forbes & Hanley 1851 (Pl. 113, figs. 6, 7).

LICTOCONCHA Gregorio, 1880. Type? : *Borsonia solitaria* Gregorio. Fauna S. Giov. Ilarione 1, p. 61. (Paper not seen.)

LIENARDIA Jousseaume, 1884 (p. 40). Type (o.d.) : *Clavatula rubida* Hinds. Recent, New Guinea. Figd. Reeve 1845 (Pl. 25, f. 220), Hedley 1922 (Pl. 49, f. 102, protoconch) ...... MANGELIINAE

LIOGLYPHOSTOMA Woodring, 1928 (p. 193). Type (o.d.) : *L. adematum* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 8, f. 10) .... MANGELIINAE

LIRACRAEA Odhner, 1924 (p. 44). Type (o.d.) : *Clathurella epentroma* Murdoch. Recent, N.Z. Figd. Murdoch 1905 (Pl. 7, figs. 3, 4) .... MANGELIINAE

LISSODRILLIA Bartsch & Rehder, 1939 (p. 129). Type (o.d.) : *Cerodrillia (L.) schroederi* B. & R. Recent, Florida. Figd. Bartsch & Rehder 1939 (Pl. 17, f. 8) .... CLAVINAE

LOPHIOTOMA Casey, 1904 (p. 130). Type (s.d. Woodring 1928, p. 146) : *Pleurotoma tigrina* Lamarck. Recent, Indo-Pacific. Figd. Kiener 1839-40 (Pl. 8, fig. 1) .... TURRINAE

LORA Gistel, 1848 (p. 9). Nom. nov. for *Defrancia* Millet. Dall's 1918, p. 318 designation of *Tritonium viridulum* Fabr. is invalid, as that species was not in Millet's list. Grant & Gale (1931, p. 512) consider that as Gistel's original citation was "*Defrancia* (Millet Gasterop. *D. viridula* O. Fabr.) : *Lora* N.," then *Lora* is a new proposition based upon *viridula* and that species is available as type. Gistel's entry, however, is not a type designation, so the status of *Lora* must remain as a nom. nov. for *Defrancia*. *Oenopota* to be used for *Lora* auct.

(**LOVELLONA** Iredale, 1917) (p. 329). Type (o.d.) : *Conus atramentosus* Reeve. Recent, Philippines. Not a Turrid. Listed with *Conidae* by Tomlin 1937, p. 216.

LUCERAPEX Iredale, 1936 (p. 321). Type (o.d. p. 337) : *Pleurotoma casearia* Hedley & Petterd. 250 fath. N.S.W., Australia. Figd. Hedley & Petterd 1906 (Pl. 37, f. 5) .... TURRINAE

LYROMANGILIA Monterosato, 1917 (p. 25). Type (monotypy) : *Pleurotoma taeniata* Deshayes. Recent, Mediterranean. Figd. Tryon 1884 (Pl. 21, f. 13) .... MANGELIINAE

LYROSURCULA Casey, 1904 (p. 156). Type (here designated) : *L. elegans* Casey (Claibornian) Middle Eocene, U.S.A. Figd. Harris 1937 (Pl. 13, f. 34).

MACTEOLA Hedley, 1918 (p. M79). Type (o.d.) : *Purpura (Cronia) anomala* Angas. Recent, Australia. Figd. Hedley 1922 (Pl. 53, f. 153)................................ MANGELIINAE

MANGELIA Risso, 1826 (p. 219). Type (s.d. Herrmannsen 1852, p. 80) : *Mangelia striolata* Risso. = *Pleurotoma villiersii* Michaud = *Murex attenuatus* Montagu. Recent, Mediterranean to Britain. Figd. Grant & Gale 1931 (Pl. 25, figs. 18, 19a, 19b; comparisons of Risso's & Kiener's figs. of *striolata* and *villiersii* respectively). Woodring 1928, p. 178, believed that *striolata* Risso had been unsatisfactorily accounted for and so advised the use of *Bela* Gray for *Mangelia* auct., but not of Risso. *Villiersiella* Monterosato 1890, based on *Murex attenuatus,* becomes a synonym .... MANGELIINAE

MANGILIELLA Bucquoy, Dautzenberg & Dollfus, 1883 (p. 129). Type (o.d.) : *Pleurotoma multilineolata* Deshayes. Recent, Mediterranean. Figd. Cossmann 1896 (Pl. 7, f. 13).

MAORIMORPHA Powell, 1939 (p. 235). Type (o.d.) : *Mitromorpha suteri* Murdoch. Recent, N.Z. Figd. Murdoch 1905 (Pl. 7, f. 6) .... BORSONIINAE

MAPPINGIA Ludbrook, 1941 (p. 99). Type (o.d.) : *M. acutispira* Ludbrook. (Adelaidean) Middle Pliocene, S. Australia. Figd. Ludbrook, 1941 (Pl. 5, f. 21) .... MANGELIINAE

MARITA Hedley, 1922 (p. 312). Type (o.d.) : *Cythara compta* Ad. & Ang. Recent, Southern Australia. Figd. Hedley 1922 (Pl. 53, f. 139)................................ MANGELIINAE

MARSHALLARIA Finlay & Marwick, 1937 (p. 83). Type (o.d.) : *Verconella spiralis* Allan. (Tahuian) Upper Eocene, N.Z. Figd. Allan 1926 (Pl. 76, f. 9) .... CONORBIINAE

MARSHALLENA Allan, 1926 (Dec. 7, p. 291). Type (monotypy) : *Daphnella neozelanica* Suter = *Belophos incertus* Marshall. (Tahuian) Upper Eocene, N.Z. Figd. Suter 1917 (Pl. 7, f. 4). Page priority over *Marshallena* Finlay 1926. . . . . CONORBIINAE

MARSHALLENA Finlay, 1926a (Dec. 23, p. 413). Type (o.d.) : *Belophos incertus* Marshall = *Daphnella neozelanica* Suter . . . . CONORBIINAE

MEGASURCULA Casey, 1904 (p. 147). Type (s.d. Grant & Gale 1931, p. 495) : *Pleurotoma (Surcula) carpenteriana* Gabb. Pliocene-Recent California. Figd. Grant & Gale 1931 (Pl. 25, figs. 4a, 4b) . . . . CONORBIINAE

MELATOMA Swainson, 1840 (pp. 202, 342). Type (monotypy) : *M. costata* Swainson. "Ohio," U.S.A. Type doubtful. *Clionella* used for preference. Dall (1918, p. 317) considered that *M. costata* was not fluviatile, but belonged to the S. African Turrid group later named *Clionella* Gray 1847. Iredale, however (1918, p. 33) advocated the retention of *Clionella* until the type of *M. costata* is traced.

MESOCHILOTOMA Seeley 1861 (p. 284). Type (monotypy) : *M. striata* Seeley. Upper greensand of Cambridge, England, Cretaceous. Equals *Surculites* Conrad according to Dall 1918, p. 328. See also Grant & Gale 1931, p. 493. Figd.?

MICANTAPEX Iredale, 1936 (p. 319). Type (o.d.) : *Bathytoma agnata* Hedley & Petterd. 250 fath. off Sydney, New South Wales. Figd. Hedley & Petterd 1906 (Pl. 37, f. 3) . . . . TURRINAE

MICRODRILLIA Casey, 1903 (p. 276). Type (s.d.) Cossmann 1906, p. 223 : *Pleurotoma cossmanni* Meyer (= *P. meyeri* Aldrich.) Upper Eocene, Jackson, Mississippi, U.S.A. Figd. Cossmann 1906 (Pl. 14, figs. 17, 18) . . . . CLAVINAE

MICROPLEUROTOMA Thiele, 1929 (p. 362). Type (o.d.) : *Pleurotoma spirotrophoides* Thiele. Recent, South Africa, 126-2750 metres. Figd. Thiele 1925 (Pl. 23, f. 18). . . . . ? Subfamily

MICROSURCULA Casey, 1904 (p. 154). Type (here designated) : *M. nucleola* Casey. (Lower Claibornian) Eocene, Louisiana. Figd. Harris 1937 (Pl. 13, figs. 20, 20a).

MIRACLATHURELLA Woodring, 1928 (p. 189). Type (o.d.) : *M. vittata* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 8, figs. 2-4) . . . . MANGELIINAE

MITRATOMA Olsson, 1930 (p. 37). Type (o.d.) : *S. (M.) bartschi* Olsson. Eocene, Peru. Subgenus of *Scobinella*. Figd. Olsson 1930 (Pl. 4, figs. 6-9) . . . . BORSONIINAE

MITRITHARA Hedley, 1922 (p. 233). Type (o.d.) : *Columbella alba* Petterd. Recent, Tasmania. Figd. Hedley 1922 (Pl. 43, f. 22) . . . . BORSONIINAE

(**MITROLUMNA** Bucquoy Dautzenberg & Dollfus, 1883) (p. 121). Type (o.d.) : *Mitra olivoidea* Cantraine. Recent, Mediterranean. Figd. Thiele 1929 (f. 452, p. 366) = *Mitridae*. See Grant & Gale 1931, p. 596.

MITROMORPHA A. Adams, 1865 (p. 182). Type (monotypy) : *M. filosa* Carpenter. Recent, California. Figd. Tryon 1884 (Pl. 25, f. 63). See Iredale 1917, p. 328 . . . . BORSONIINAE

MONILISPIRA Bartsch & Rehder, 1939 (p. 137). Type (o.d.) : *Drillia monilifera* Carp. Recent, Gulf of California. Figd. . . . . CLAVINAE

MONILIOPSIS Conrad, 1865 (p. 143). Type (monotypy) : *Pleurotoma elaborata* Conrad. (Claibornian) Middle Eocene, Alabama. Non *Moniliopsis* Cossmann, 1918. Figd. Harris 1937 (Pl. 12, figs. 1-4) . . . . BORSONIINAE

MORDICA Dall, 1924 (p. 88). Type (o.d.) : *M. brunonia* Dall. Recent, Hawaiian Is. Unfigured. Described as a minute shell strongly resembling *Turricula*.

NANNODIELLA Dall, 1918a. "Type : *N. nana* Dall." A nomen nudum; type not described until 1919.

NANNODIELLA Dall, 1919 (p. 59). Type (o.d.) : *Philbertia (N.) nana* Dall. Recent, Gulf of California, 26 fath. Figd. Dall, 1919 (Pl. 20, f. 7). . . . . MANGELIINAE

NEKEWIS Stewart, 1926 (p. 421). Type (o.d.) : *"Fasciolaria" washingtoniana* Weaver. (Doubtfully a Turrid, may be Fusoid according to Wrigley 1927.)

NEOGURALEUS Powell, 1939 (p. 236). Type (o.d.) : *Drillia sinclairi* Gillies. Recent, N.Z. Figd. herein (Pl. 6, fig. 1) . . . . MANGELIINAE

NEPOTILLA Hedley, 1918 (p. M79). Type (o.d.) : *Daphnella bathytoma* Verco. Recent, S. Australia. Figd. Verco, 1909 (Pl. 28, f. 3) . . . . DAPHNELLINAE

NEPTUNELLA Meek, 1864, non Gray, 1853, non Verrill, 1873. See *Rhombopsis* Gardner, 1916.

(NESAEA Risso, 1826) non Leach, 1814, non Koch,1835 = *Chauvetia* Pyrenidae. See Grant & Gale 1931, p. 686.

NETRUM Philippi 1850. Abh. u. Beschr. Conchyl. p. 118. Type: *Fusus nifat* (Adanson) Brug. = *Fusionella*. See Dall 1918, p. 330.

NICOLIA Gregorio, 1880. Non *Nicolia* Malmgren, 1865 (Dall, 1918, p. 329).

OENOPOTA Moerch, 1852 (p. 73). Type (s.d. Dall, 1919, p. 40) : *Pleurotoma pleurotomaria* Couthuoy. *Bela pyramidalis* Strom. considered a synonym of *pleurotomaria* Couthuoy by Grant & Gale 1931, p. 528, figd. Tryon 1884 (Pl. 28, f. 40). ? Subfamily. Recent, Massachusetts Bay. Recommended as substitute for "*Bela*" auct. by Iredale 1915, p. 229. Equals *Lora* auct. non Gistel, 1848.

OLIGOTOMA Bellardi, 1875. Non Westwood 1836. See *Asthenotoma*.

OOTOMA Koperberg, 1931 (p. 48). Type (? Name proposed for two species; *O. jonkeri* Koperberg here selected). Tertiary, Timor. Figd. Koperberg 1931 (Pl. 1, f. 13). Resembles *Scrinium* .... BORSONIINAE

OOTOMELLA Bartsch, 1933 (p. 76) nom. nov. for *Ootoma* Koperberg 1931, non Dejean 1833, non Blanchard, 1850.

ORTHOSURCULA Casey, 1904 (p. 151). Type (s.d. Gardner 1935) : *Pl. longiforma* Aldrich. Eocene, Mississippi. Figd. Harris 1937 (Pl. 9, f. 25) .... TURRICULINAE

OTITOMA Jousseaume, 1898 (p. 106). Type (tautonomy) : *O. ottitoma* Jousseaume. Recent, Red Sea. Unfigured, status uncertain, see Woodring 1928, p. 189.

OXYACRUM Cossmann, 1889 (p. 274). Type (o.d.) : *Pleurotoma obliterata* Deshayes. Eocene, Paris Basin. Figd. Cossmann & Pissaro 1900 (Pl. 6, f. 31 "cf. *obliterata*").

PACHYCYTHARA Woodring, 1928 (p. 174). Type (o.d.) : *P. cryptonata* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 6, f. 17) .... MANGELIINAE

PARABORSONIA Pilsbry, 1922 (p. 325). Type (o.d.) : *Mitra varicosa* Sowerby. Miocene, Dominican Republic. Figd. Pilsbry 1922 (Pl. 17, figs. 19-21) .... BORSONIINAE

PARACLATHURELLA Boettger, 1895 (p. 56). Type (o.d.) : *Pleurotoma gracilenta* Reeve. Recent, Philippine Is. Figd. Reeve 1843 (Pl. 14, f. 114) .... MANGELIINAE

PARASYRINX Finlay, 1924 (p. 514). Type (o.d.) : *Pleurotoma alta* Harris. (Awamoan) Middle Miocene, N.Z. Figd. Suter 1914 (Pl. 2, f. 12) .... COCHLESPIRINAE

PERATOTOMA Harris & Burrows, 1891 (p. 113), nom. nov. for *Homotoma* Bellardi, 1875, non Guérin Ménéville, 1844. *Homotoma* Bellardi covered two species, *H. reticulata* (Renier) and *H. semicostata* Bellardi. No type was designated. The selection of *reticulata* would make *Peratotoma* a synonym of *Philbertia* Monterosato, 1884. Woodring 1928, p. 188, left open the matter of type designation. *Pleurotoma reticulata* (Renier). Recent, Mediterranean. Figd. Reeve 1843 (Pl. 15, f. 122). I have not seen *semicostata* Bellardi.

PERRONA Schumacher, 1817 (pp. 66, 218). Type (monotypy) : *Perrona tritonium* Schum. = *Murex perron* Chemnitz = *Pleurotoma perronii* Reeve. Recent, West Africa. Figd. Reeve 1843 (Pl. 11, f. 93) .... CLAVATULINAE

PERRONIA Gray 1841 is a misprint for *Perrona* Schumacher 1817.

PHANDELLA Casey, 1903. Type (monotypy) : *P. nepionica* Casey. Upper Vicksburgian, U.S.A. Figd. Harris 1937 (Pl. 14, f. 26).

PHENATOMA Finlay, 1924 (p. 515). Type (o.d.) : *Pleurotoma novae-zelandiae* Reeve. Recent, N.Z. Figd. Suter 1915 (Pl. 46, f. 23) .... CLAVINAE

PHILBERTIA Monterosato, 1884 (p. 132). Type (tautonomy) : *Pleurotoma philberti* Michaud. Recent, Mediterranean (in synonymy of *Pleurotoma bicolor* Risso). Figd. Reeve 1843 (Pl. 16, f. 129) .... DAPHNELLINAE

PHLYCTAENIA Cossmann, 1889 (p. 245). Type: *Borsonia nodularis* Deshayes. Eocene. Paris Basin. Non *Phlyctaenia* Huebner, 1825.

PHLYCTIS Harris & Burrows, 1891 (p. 113) nom. nov. for *Phlyctaenia* Cossmann, 1889, non Huebner, 1825 = *Cordieria* Rouault (Dall 1918, p. 330.

(PHOLIDOTOMA Cossmann, 1896). Not a Turrid = *Volutidae*. See Dall 1918, p. 330.

PHYMORHYNCHUS Dall, 1908 (p. 258). Type (o.d.) : *Pleurotomella castanea* Dall. Recent, E of Galapagos Is. 1,322 fath. Figd. Dall 1908 (Pl. 1, f. 1). A synonym of *Steiraxis* according to Grant & Gale 1931, p. 509 .... COCHLESPIRINAE

PLAGIOSTROPHA Melvill, 1927 (p. 151). Type (monotypy) : *P. quintuplex* Melvill. Locality unknown. Figd. Melville 1927 (Pl. 12, f. 5). ? Subfamily.

PLATYCYTHARA Woodring, 1928 (p. 172). Type (o.d.) : *P. eurystoma* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 6, f. 13) .... MANGELIINAE

PLENTARIA Harris, 1937 (p. 59). Type (o.d.) : *Pl. (Borsonia) plenta* Ald. & Har. 1895. (Claibornian) Middle Eocene, Texas. Figd. Harris 1937 (Pl. 11, figs. 2, 3, 3a) .... BORSONIINAE

PLEUROBELA Kobelt, 1905 (p. 301). Type (monotypy) : *B. spelta* (Monterosato) Locard. Recent, Europe. Figd. ? (Not seen.)

PLEUROFUSIA de Gregorio, 1890 (p. 33). Type (o.d.) : *Pleurotoma (P.) longirostropis* de Gregorio. (Claibornian) Middle Eocene, Alabama. Figd. de Gregorio 1890 (Pl. 2, figs. 26, 27) .... TURRICULINAE

PLEUROLIRIA de Gregorio, 1890 (p. 38). Type (o.d.) : *Pleurotoma (P.) supramirifica* de Gregorio. (Claibornian) Middle Eocene, Alabama. Figd. Harris 1937 (Pl. 1, figs. 5, a, b) TURRINAE

PLEUROPYRAMIS Vredenburg, 1921 (p. 126). Type (monotypy) : *Mangilia (Clathurella) quinqueangularis* Vred. (Kama = *Aquitanian)* Lower Miocene, Burma. Figd. Vredenburg 1921 (Pl. 14, f. 8) .... ? BORSONIINAE

PLEUROTOMA Lamarck, 1799. Type (monotypy) : *Murex babylonius* Linn. Equals *Turris* Bolten, 1798 .... TURRINAE

PLEUROTOMELLA Verril, 1873 (p. 15). Type (monotypy) : *P. packardi* Verrill. Recent, N.E. coast U.S. America. Figd. Tryon 1884 (Pl. 29, f. 59) .... ? MANGELIINAE

PLEUROTOMINA Beck, 1847. According to Grant & Gale, 1931, pp. 512-513, this name was not published in a generic sense, but as a group name for small Turrids. Dall, 1918, p. 330, cited the name as "New name for *Defraneia* Millet not Bronn. *Bela impressa* Moerch, sole species." *Pleurotomina* Beck, 1847, was not proposed as a new name for *Defraneia* and *Pleurotoma (Ischnula) impressa* Moerch was not described until 1869. A nomen dubium.

PLEUROTOMOIDES Bronn, 1831 (p. 47). Nom. nov. for *Defraneia* Millet, 1827, non *Defraneia* Bronn 1825. See Iredale 1917, p. 326, & Woodring, 1928, p. 187. Type (s.d.) Dall 1908, p. 260) : *Defraneia pagoda* Millet. Miocene, Italy. Figd. Millet 1827 (Pl. 9, f. 1). ?Subfamily. Note: Dall (1908, p. 260) designated *pagoda* Millet as genotype of both *Clathurella* and *Defraneia,* since the former was published as a nom. nov. for *Defraneia.*

PLEUROTOMUS Montfort, 1810 (= *Turris* Bolten, 1798).

POLYSTIRA Woodring, 1928 (p. 145). Type (o.d.) : *Pleurotoma albida* Perry. Recent, West Indies. Figd. M. Smith 1937 (Pl. 52, figs. 15a, 15b as "*Turris virgo* Wood" .... TURRINAE

PONTIOTHAUMA E. A. Smith, 1895 (p. 2). Type (o.d. see p. 3, line 20) : *P. mirabile* Smith. Recent, 753 fath., Bay of Bengal. Figd. Smith 1895 (Pl. 1, f. 1) .... DAPHNELLINAE

PRISCOFUSUS Conrad, 1865b (p. 150). Type (s.d. Cossmann, 1901, p. 8) : *Fusus geniculus* Conrad. "Eocene," Oregon, U.S.A. = Miocene. Referred to *Turridae* with some doubt by Grant & Gale 1931, pp. 490-492. Figd. Wilkes 1849 (Pl. 20, f. 3) .... ? CONORBIINAE

PROPEBELA Iredale, 1918 (p. 32). Type (o.d.) : *Murex turricula* Montagu. Recent, British Isles and N. Europe. Figd. Forbes & Hanley 1851 (Pl. 111, figs. 7, 8) .... BORSONIINAE

PROTOSURCULA Casey, 1904 (p. 144). Type (o.d.) : *Pl. gabbi* Conrad. Eocene, Texas. Figd. Cossmann 1906 (Pl. 14, f. 22) .... TURRICULINAE

PSEUDODAPHNELLA Boettger, 1895 (p. 58). Type (o.d.) : *Clathurella philippinensis* Reeve. Recent, Philippine Is. Figd. Reeve 1843 (Pl. 13, f. 109) .... DAPHNELLINAE

PSEUDODRILLIA Dukooizen, 1924 (p. 67) *"longa, arabica, & abnormalis."* Eocene, Turkestan. Type ? See Zool. Rec. for 1925, 62, Moll. p. 68. (Not seen.)

PSEUDOMATA von Martens, 1901 (p. 19) *"Pleurotoma (Pseudomata) chuni." "Pseudomata"* is a misprint for *Pseudotoma,* as later explained by Martens & Thiele 1903, p. 86. The species *chuni* is a *Pontiothauma.*

PSEUDOMELATOMA Dall, 1918a (p. 317). Type (o.d.) : *Pleurotoma penicillata* Carpenter. Recent, California. Figd. Grant & Gale 1931 (Pl. 26, f. 5) .... ? TURRICULINAE

PSEUDORAPHITOMA Boettger, 1895 (p. 56). Type (o.d.) : *Mangelia fairbanki* Nevill. Recent, Indian Ocean. Figd. Hedley, 1922 (Pl. 51, figs. 127-129) .... MANGELIINAE

PSEUDOTOMA Bellardi, 1875, non *Pseudotoma* Gray, 1825, non *Pseudotomia* Stephens, 1829. See *Acamptogenotia.*

PSEUDOTOMINA Finlay 1924 (p. 515), nom. nov. for *Pseudotoma* Bellardi, 1875. (See *Acamptogenotia.)*

PTYCHOBELA Thiele, 1925 (p. 215). Type (o.d.) : *Pl. crenularis* Lamarck. Recent, Tranquebar. Figd. Reeve 1843 (Pl. 7, f. 54) & Kiener 1839-40 (Pl. 19, f. 2) .... CLAVINAE

PTYCHOSYRINX Thiele, 1925 (p. 210). Type (o.d.) : *Pl. bisinuata* Martens. Recent, E. Africa, 1,134 fath. Figd. Thiele, 1929 (f. 437, p. 359)............................... ? TURRICULINAE

PUHA Marwick, 1931 (p. 149). Type (o.d.) : *P. fulgida* Marwick. (Hutchinsonian) Lower Miocene, N.Z. Figd. Marwick 1931 (Pl. 16, f. 312) .... DAPHNELLINAE

PUSIONELLA Gray, 1847 (p. 137). Type (o.d.) : *Murex pusio* Born. = *P. nifat* (Adanson) Brug. Recent, N. Africa & Mediterranean. Figd. Grant & Gale 1931 (Pl. 25, figs. 12a, 12b) .... CLAVATULINAE

PYRGOCYTHARA Woodring, 1928 (p. 171). Type (o.d.) : *P. eminula* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 6, f. 12)................................. MANGELIINAE

RAPHITOMA Bellardi 1848. Type (s.d. Monterosato 1875) : *Pleurotoma hystrix* Jan. Pliocene-Recent, Mediterranean. Figd. Harmer 1915 (Pl. 28, figs. 24, 25) .... MANGELIINAE

RHOMBOPSIS Gardner, 1916 = *Neptunella* Meek, 1864 non Gray, 1853. Type: *Fusus newberryi* Meek & Hayden. Upper Cretaceous, Missouri. May be a Turrid according to Finlay & Marwick, 1937, p. 84 .... ? CONORBIINAE

RIMOSODAPHNELLA Cossmann, 1915 (sic *Rimosodalphnella*) (p. 229). Type (o.d.) : *Murex textilis* Br. (Plaisancien) Lower Pliocene, Italy. Figd. Cossmann, 1915 (Pl. 11, f. 24, 25) DAPHNELLINAE

RISSOMANGILIA Monterosato, 1917. Type (see Dall 1918) : *Pleurotoma bertrandi* Pay. Recent, Mediterranean. A synonym of *Cytharella (Citharella*, typ. error) according to Thiele 1929, p. 366.

ROUAULTIA Bellardi, 1878. Type: *Pl. subterebralis* Bellardi & Sismonda. Resembles *Gemmula*. Grant & Gale (1931, p. 505) synonymise this with *Cochlespira*, but the sinus is on the shoulder in that genus). Figd. Cossmann 1896 (Pl. 6, figs. 16, 17).

RUBELLATOMA Bartsch & Rehder, 1939 (p. 130). Type (o.d.) : *Mangelia rubella* Kurtz & Stimpson. Recent, N. Carolina to Florida. Figd. ? .... MANGELIINAE

RUGOBELA Finlay, 1924 (p. 514). Type (o.d.) : *Ptychatractus tenuiliratus* Suter. (Awamoan) Middle Miocene, N.Z. Figd. Suter 1917 (Pl. 7, f. 2) .... DAPHNELLINAE

RUSCULA Casey, 1904 (p. 161). Type (o.d.) : *Fusus plicata* Lea. (Claibornian) Middle Eocene, U.S.A.

SACCHAROTURRIS Woodring, 1928 (p. 182). Type (o.d.) : *Mangilia consentanea* Guppy. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 7, f. 11) .... MANGELIINAE

(SAVATIERIA Rochbrune & Mabille, 1885). Although referred to the *Turridae* by its authors, Dall (1918, p. 331) considers it an *Anachis*. Pyrenidae.

SCABRELLA Hedley, 1918 (p. M79) non *Scabrella* Sacco, 1890. (See *Asperdaphne* nom. nov. for *Scabrella* Hedley.)

SCOBINELLA Conrad, 1848 (p. 120). Type (monotypy) : *Scobinella coelata* Conrad. Upper Oligocene, Mississippi. Figd. Conrad 1848 (Pl. 12, figs. 8, 9) .... BORSONIINAE

SCRINIUM Hedley, 1922 (p. 259). Type (o.d.) : *Mitromorpha brazieri* Smith. Recent, N.S.W., Australia. Figd. Smith 1891 (Pl. 40, f. 2).................................. BORSONIINAE

SINISTRELLA O. Meyer, 1887. Type: *"Triforis" americanus* Aldrich. (Claibornian) Middle Eocene, U.S.A. Regarded by Cossmann (1896) as a sinistral form of *Trypanotoma* 1893. Figd. Cossmann 1896 (Pl. 7, figs. 22, 23).

SMITHIA Monterosato, 1884 (p. 128). Type (monotypy) : *Pl. striolata* Scacchi non Risso. Recent-Mediterranean. Figd. Reeve 1846 (Pl. 35, f. 320), non *Smithia* Maltzan 1883, non Edwards & Haime, 1851. See *Smithiellia*.

SMITHIELLIA Monterosato, 1890 (p. 186), nom. nov. for *Smithia* Monterosato, 1884, non Maltzan, 1883, etc. Apparently a synonym of *Bela* .... MANGELIINAE

(SPEIGHTIA Finlay, 1926) (p. 252). Type (o.d.) : *Euthriofusus spinosus* Suter. (Bortonian) Eocene, N.Z. Figd. Suter 1917 (Pl. 4, figs. 1, 2) .... SPEIGHTIIDAE

SPERGO Dall, 1895 (p. 680). Type (s.d. Dall, 1918, p. 331) : *S. glandiniformis* Dall. Recent, Hawaii, 298-375 fath. Figd. Dall, 1895 (Pl. 24, figs. 1 & 2) .... DAPHNELLINAE

SPIROTROPIS G. O. Sars, 1878 (p. 242). Type (monotypy) : *S. carinata* Philippi. Recent, Norway to Azores. Figd. Cossmann 1896 (Pl. 5, figs. 26, 27). ? Subfamily.

SPLENDRILLIA Hedley, 1922 (p. 250). Type (o.d.) : *Drillia woodsi* Beddome, 1883. Recent, Tasmania. Figd. May 1923 (Pl. 35, f. 19) .... CLAVINAE

STEIRAXIS Dall, 1895 (p. 15). Type (o.d.) : *Pl. (Steiraxis) aulaca* Dall. Recent, Gulf of Panama, 1,772 fath., to Acapulco, Mexico, 1,879 fath. Figd. Dall 1908 (Pl. 2, fig. 5) ... COCHLESPIRINAE

STEIRONEPION Pilsbry & Lowe, 1932 (p. 57). Type (o.d.) : *"Mangelia" melanosticta* P. & L. Figd. Pilsbry & Lowe 1932 (Pl. 3, f. 9). Recent, Nicaragua .... MANGELIINAE

STELLATOMA Bartsch & Rehder, 1939 (p. 132). Type (o.d.) : *Mangelia stellata* Stearns. Recent, Florida. Figd. ? .... MANGELIINAE

STILLA Finlay, 1926 (p. 254). Type (o.d.) : *Mangilia flexicostata* Suter. Recent, N.Z. Figd. Suter 1899 (Pl. 3, figs. 3, 32) .... DAPHNELLINAE

STROMBINA Gregorio, 1890 (p. 25). Type ? (See Dall 1918, p. 331) : *Pl. stromboides* Lamarck. (Claibornian) Middle Eocene, U.S.A. Non *Strombina* Moerch, 1852. Equals *Gemmula* according to Dall, 1918, p. 331.

STRUTHIOLARIOPSIS Wilckens, 1904. Type: *Fusus ferrieri* Philippi. Senonian (Cretaceous) Chile. (See Marwick 1924, Trans. N.Z. Inst. 55, p. 161).

SUAVODRILLIA Dall, 1918a (p. 331). Type (o.d.) : *Drillia kennicottii* Dall. Recent, Alaska. Figd. Oldroyd 1927 (Pl. 6, f. 5) .... COCHLESPIRINAE

SUBULATA von Martens 1901 (p. 82). Used by Martens as of Anton 1839 for *Pl. bisinuata* von Martens, but Anton did not use name in a nomenclatorial sense. See Dall 1918, p. 331. Martens' *Pl. bisinuata* was later (Thiele 1925, p. 210) made genotype of *Ptychosyrinx* Thiele 1925.

SURCULA H. & A. Adams, 1853 (p. 88). Type (s.d. Cossmann 1889, p. 259) : *Pleurotoma nodifera* Lamarck = *Murex javanus* Linn. Synonym of *Turricula* Schum. 1817. Recent, East Indies. Figd. Tryon 1884 (Pl. 5, f. 63).

SURCULINA Dall, 1908 (p. 260). Type (o.d.) : *Daphnella (Surculina) blanda* Dall. Recent, off Cocos Id., Gulf of Panama, 1,067 fath. Figd. Dall 1908 (Pl. 3, f. 1). Subgenus of *Leucosyrinx* according to Grant & Gale 1931, p. 509) .... COCHLESPIRINAE

SURCULITES Conrad, 1865a (p. 213). Type (monotypy) : *Surcula annosa* Conrad. Eocene, New Jersey. Doubtfully Turrid according to Wrigley, 1939. Figd. Conrad 1865 (Pl. 20, f. 9). Associated with *Cryptoconus, Megasurcula & Clinura* by Grant & Gale 1931, pp. 492-495. CONORBIINAE

SURCULOFUSUS Vincent, 1895. For two new species, *bruxellensis & odontotus* Vincent. Type?. Eocene, Belgium.

SURCULOMA Casey, 1904 (p. 153). Type (o.d.) : *Pl. tabulata* Conrad. (Claibornian) Middle Eocene, U.S.A. Figd. Cossmann 1906 (Pl. 14, figs. 14, 15).

SYNTOMODRILLIA Woodring, 1928 (p. 160). Type (o.d.) : *Drillia lissotropis* Dall. Recent, West Indies, 73-290 fath. Figd. Dall, 1889 (Pl. 11, figs. 3, 4) .... CLAVINAE

SYSTENOPE Cossmann, 1889 (p. 293). Type (o.d.) : *Raphitoma polycolpa* Cossmann. Eocene, Paris Basin. (Cossmann later, 1896, considered *Systenope* a synonym of *Pleurotomella* Verrill. Needs confirmation.)

TARANIS Jeffreys, 1870 (p. 447). Type (monotypy) : *T. morchi* Malm. Recent, Norway to Mediterranean, Atlantic coast of U.S.A. to Gulf of Mexico. Figd. Tryon 1884 (Pl. 29, f. 66). Related to *Hemipleurotoma* according to Grant & Gale, 1931, p. 572 .... TURRINAE

TELEOCHILUS Harris, 1897 (p. 64). Type (o.d.) : *Daphnella gracillima* Tenison-Woods. Janjukian) Lower Miocene, Tasmania. Figd. Harris 1897 (Pl. 3, f. 12 = n. sp. closely allied to genotype).

TENATURRIS Woodring, 1928 (p. 185). Type (o.d.) : *Cythara guppyi* Dall. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 7, f. 16) .... MANGELIINAE

TEREBRITOMA Cossmann, 1892 (p. 773). Type (o.d.) : *Mangelia solitaria* Whitfield. Cretaceous of Syria. Figd. Cossmann 1896 (p. 111, f. 26).

TERES Bucquoy, Dautzenberg & Dollfus, 1883 (p. 86), non *Teres* Boettger, 1878. See *Teretia*.

TERETIA Monterosato, 1890 (p. 187), nom. nov. for *Teres* B. D. & D., non Boettger 1878. Type (o.d.) : *Pl. anceps* Eichwald. Recent, Norway to Mediterranean. Figd. Tryon 1884 (Pl. 18, f. 39) .... ? Subfamily

(**THATCHERIA** Angas, 1877) (p. 529). Type (monotypy) : *T. mirabilis* Angas. Recent, Japan. Figd. Angas 1877 (Pl. 54, figs. 1a, 1b) .... THATCHERIIDAE

THELECYTHARA Woodring, 1928 (p. 173). Type (o.d.) : *Cythara mucronata* Guppy. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 6, f. 14) .... MANGELIINAE

THESBIA Jeffreys, 1867 (p. 359). Type (monotypy) : *Tritonium ? nanum* Loven. Recent, Northern Europe to Orkney Is., etc. Figd. Forbes & Hanley 1851 (Pl. 112, f. 8) .... BORSONIINAE

THETIDOS Hedley, 1899 (p. 472). Type (o.d.) : *T. morsura* Hedley. Recent, Funafuti Atoll, S. Pacific. Figd. Hedley, 1899 (f. 42, p. 473) .... MANGELIINAE

THOLITOMA Finlay & Marwick, 1937 (p. 85). Type (o.d.) : *T. dolorosa* F. & M. (Wangaloan) Upper Cretaceous, N.Z. Figd. Finlay & Marwick 1937 (Pl. 12, figs. 6, 7, 11) .. TURRICULINAE

TOMELLA Swainson, 1840 (pp. 155, 314). Type (s.d. Herrmannsen 1849, p. 579) : *Pl. lineata* Lamarck. Recent, West Africa. Figd. Kiener 1839-40. A syn. of *Perrona*. Preoccupied by *Tomella* Robineau Desvoidy, 1830.

TOMOPLEURA Casey, 1904 (p. 138). Type (o.d.) : *Pl. nivea* Philippi. Recent, Formosa and Karachi. Figd. Tryon 1884 (Pl. 4, f. 42, as *violacea* Hinds) .... CLAVINAE

TRACHELOCHETUS Cossmann, 1889 (p. 250). Type (o.d.) : *Pl. desmia* Edwards. (Bartonian) Upper Eocene, England. Figd. Cossmann 1896 (Pl. 4, figs. 17, 18). Equals *Gemmula* according to Dall 1918, p. 332; and a subgenus of *Clavatula* according to Grant & Gale 1931, p. 485. It seems to be a distinct genus allied to *Clavatula* rather than to *Gemmula*. CLAVATULINAE

TRIPIA Gregorio, 1890 (p. 38). Type (?see Harris 1937, p. 19) : *Pl. anteatripla* Gregorio. (Claibornian) Middle Eocene, U.S.A. Figd. Harris 1937 (Pl. 3, figs. 10, 11 & 12?). Status uncertain.

TRITONIMANGILIA K. Martin, 1914 (p. 126). Type? Upper Oligocene, Java. (Paper not seen.)

TRITONOTURRIS Dall, 1924 (p. 88). Type (o.d.) : *Clathurella robillardi* Barclay, 1869. Recent, Mauritius. Figd. Tryon 1884 (Pl. 16, f. 55).

TROPISURCULA Casey, 1904 (p. 153). Type (s.d. Cossmann 1906, p. 222) : *Drillia caseyi* Aldrich. Oligocene, Mississippi .... TURRICULINAE

TRYPANOTOMA Cossmann, 1896 (p. 109). Type (o.d.) : *Pl. terebriformis* O. Meyer. Eocene, Gulf Coast, U.S.A. Figd. Cossmann 1896 (Pl. 6, figs. 27, 28) .... CLAVINAE

TURRHYSSA Dall, 1924 (p. 88). Type (o.d.) : *Clathurella bicarinata* Pease. Recent, Hawaiian Islands. Figd. Tryon 1884 (Pl. 17, f. 90). A synonym of *Eucyclotoma*. See Thiele 1929, p. 369.

TURRICULA Schumacher, 1817 (p. 217). Type (monotypy) : *T. flammea* Schum. = *Murex javanus* Chem., non Linn = *Murex tornatus* Dillwyn, non *Turris tornatum* Bolten. Recent, East Indies. Figd. Grant & Gale (1931, Pl. 25, f. 9). See Woodring 1928, p. 166 ... TURRICULINAE

TURRICULINA Gregorio, 1930 (p. 18). Type (o.d.) : *T. unica* Gregorio. Lias, Sicily. I have not seen this publication, but the genus is recorded in the Zool. Rec. 73, p. 91.

TURRIDRUPA Hedley, 1922 (p. 226). Type (o.d.) : *Pleurotoma acutigemmata* Smith 1877. Locality unknown. Figd. Melvill, 1917 (Pl. 8, f. 1) & Hedley, 1922 (Pl. 42, figs. 12, 13). Hope Id., Queensland, specimen .... CLAVINAE

TURRIS Bolten, 1798 (p. 123). Type (s.d. Dall 1909) : *Murex babylonius* Gmel. Recent, Indo-Pacific. Figd. Kiener 1839-40 (Pl. 1, f. 1) .... TURRINAE

TYLOTIA Melvill, 1917 (p. 160). Type (o.d.) : *Strombus canicularis* Bolten 1798 (= *Pleurotoma auriculifera* Lamarck, 1822). Recent, Philippines. Figd. Reeve, 1843 (Pl. 8, f. 69) ...CLAVINAE

TYPHLOMANGELIA G. O. Sars, 1878 (p. 241). Type : *Pl. nivale* Lovén. Recent, Norway and Shetland Is. Figd. Tryon 1884 (Pl. 7, f. 92) .... ? Subfamily

TYPHLOSYRINX Thiele, 1925 (p. 219). Type (o.d.) : *Pleurotoma (Leucosyrinx) vepallida* Martens. Recent, 1,840 metres, Aden. Figd. Martens & Thiele 1903 (Pl. 2, f. 6)..DAPHNELLINAE

TYRRHENOTURRIS Coen, 1929 (p. 297). Three species mentioned, *undatiruga*, *similis* and *petitiana*. Thiele (1931, p. 741 in Tl. 2. Corrections to Tl. 1, 1929) cited *Tyrrhenoturris* as a synonym of *Fusiturris*. Type (here designated) : *Pleurotoma undatiruga* Bivona. If Thiele's statement regarding the priority of *Fusiturris* is correct, this makes Coen's genus an absolute synonym of *Fusiturris*.

(**UTTLEYA** Marwick, 1934.) Type (o.d.) : *U. arcana* Marwick. Herein referred to *Muricidae*.

VARICOBELA Casey, 1904 (p. 162). Type (o.d.) : *Strombus smithi* Aldrich. (Claibornian) Middle Eocene, U.S.A. Figd. Aldrich 1886 (Pl. 2, f. 6).

VAUGHANITES Woodring, 1928 (p. 200). Type (o.d.) : *V. leptus* Woodring. Middle Miocene, Jamaica. Figd. Woodring 1928 (Pl. 9, figs. 1, 2) .... BORSONIINAE

VEPRECULA Melvill, 1917 (p. 190). Type (o.d.) : *Clathurella sykesii* Melvill & Standen. Recent, Gulf of Oman, 156 fath. Figd. Melvill & Standen 1903 (Pl. 23, f. 4) .... DAPHNELLINAE

VEXITHARA Finlay, 1926 (p. 254). Type (o.d.) : *Antimitra vexilliformis* Marshall & Murdoch. (Awamoan) Middle Miocene, N.Z. Figd. Marshall & Murdoch 1923 (Pl. 13, f. 3)..BORSONIINAE

VILLIERSIA Monterosato, 1884 (p. 128), non d'Orbigny, 1837. See *Villiersiella*.

VILLIERSIELLA Monterosato, 1890 (p. 191), nom. nov. for "*Viellicrsia*" Monterosato, 1884, error for *Villiersia*, non d'Orbigny 1837. Type (monotypy) : *Murex attenuatus* Montagu. Recent, Europe. Figd. Forbes & Hanley (Pl. 113, figs. 8, 9). A synonym of *Mangelia*. See Grant & Gale, p. 585.

VOLUTAPEX Harris 1937 (p. 55). Type (o.d.) : *Surculoma calantica* Harris. (Claibornian) Alabama, U.S.A. Sub-gen. of *Surculoma*. Figd. Harris 1937 (Pl. 10, f. 19).

(**WAITARA** Marwick, 1931) (p. 149). Type (o.d.) : *Turricula waitaraensis* Marwick. (Urenuian) Upper Miocene, N.Z. Figd. Marwick 1926 (Pl. 74, f. 9) .... THATCHERIIDAE

XENUROTURRIS Iredale, 1929 (p. 285). Type (o.d.) : *X. legitima* Iredale. Recent, N. Queensland. Figd. Iredale1929 (Pl. 31, f. 3, 4) .... TURRINAE

(**ZAFRA** A. Adams, 1860) = *Pyrenidae*. H. Adams 1872 caused the genus name to be misapplied to the *Turridae*. (See Iredale 1916, p. 30.)

ZELIA de Gregorio, 1890 (p. 44), non *Zelia* Desvoidy, 1830. Type (o.d.) : *Borsonia (Zelia) sativa* Gregorio. (Claibornian) Middle Eocene, Alabama. A synonym of *Scobinella*; see Woodring 1928, p. 199. Figd. Harris 1937 (Pl. 12, figs. 24, 25).

ZEMACIES Finlay, 1926 (p. 252). Type (o.d.) : *Z. clatior* Finlay. (Hutchinsonian) Lower Miocene, N.Z. Figd. Finlay & Marwick 1937 (Pl. 17, figs. 5, 10) .... TURRICULINAE

ZENEPOS Finlay, 1928 (p. 250). Type (o.d.) : *Daphnella totolirata* Suter. Recent, N.Z. Figd. Suter 1908 (Pl. 7, f. 23) .... DAPHNELLINAE

ZETEKIA Dall, 1918a (p. 320). Type (monotypy) : *Z. denticulata* Dall. Recent, Panama. Figd. Dall 1919 (Pl. 1, f. 1) .... BORSONIINAE

To this List may now be added the following 31 new genera proposed in this Bulletin:—

ANTICOMITAS n. gen. Type: *A. vivens* n. sp. Recent, N.Z.

ANTIGURALEUS n. gen. Type: *A. otagoensis* n. sp. Recent, N.Z.

ANTIMELATOMA n. gen. Type: *Drillia maorum* Smith. Recent, N.Z.

AOTEADRILLIA n. gen. Type: *Pleurotoma wanganuiensis* Hutton. (Castlecliffian) Upper Pliocene, N.Z.

AUSTROCLAVUS n. gen. Type: *Drillia tenuispiralis* Marshall. (Hutchinsonian) Lower Miocene, N.Z.

BELATOMINA n. gen. Type: *Bela pulchra* Tate. (Balcombian) Middle Miocene, Victoria.

CARINACOMITAS n. subgen. of *Comitas*. Type: *Pleurotoma clarae* Tenison-Woods. (Balcombian) Middle Miocene, Victoria.

CLAVATOMA n. gen. Type: *C. pulchra* n. sp. (Opoitian-Waitotaran) Lower Pliocene, N.Z.

CRYPTODAPHNE n. gen. Type: *C. pseudodrillia* n. sp. (Hutchinsonian) Lower Miocene, N.Z.

ECHINOTURRIS n. gen. Type: "*Turris*" *finlayi* Powell. (Awamoan) Middle Miocene, N.Z.

EOSCOBINELLA n. gen. Type: *E. tahuia* n. sp. (Tahuian) Upper Eocene, N.Z.

ETREMOPSIS n. gen. Type: *Drillia imperfecta* Suter. (Awamoan) Middle Miocene, N.Z.

FUSIGURALEUS n. subgen. of *Neoguraleus*. Type: *Clathurella leptosoma* Hutton. (Awamoan) Middle Miocene, N.Z.

HAUTURUA n. subgen. of *Syntomodrillia*. Type: *S. (H.) vivens* n. sp. Recent, N.Z.

INTEGRADRILLIA n. gen. Type: *Drillia integra* Tenison-Woods. (Balcombian) Middle Miocene, Victoria.

LIRASYRINX n. gen. Type: *L. anomala* n. sp. (Duntroonian) Upper Oligocene, N.Z.

LIRATOMINA n. gen. Type: *Bela sculptilis* Tate. (Balcombian) Middle Miocene, Victoria.

MAORIDAPHNE n. gen. Type: *Daphnella clifdenensis* Laws. (Hutchinsonian) Lower Miocene, N.Z.

MAORITOMELLA n. gen. Type: *Pleurotoma albula* Hutton. Recent, N.Z.

MAUIDRILLIA n. gen. Type: *Mangilia praecophinodes* Suter. (Awamoan) Middle Miocene, N.Z.

MITRELLATOMA n. gen. Type: *Columbella angustata* Hutton. (Nukumaruan) Middle Pliocene, N.Z.

NOTOGENOTA n. gen. Type: *Hemifusus (Mayeria) goniodes* Suter. (Bortonian) Middle Eocene, N.Z.

PARACOMITAS n. gen. Type: *Surcula castlecliffensis* Marshall & Murdoch. (Castlecliffian) Upper Pliocene, N.Z.

PSEUDOINQUISITOR n. gen. Type: *P. problematicus* n. sp. (Awamoan) Middle Miocene, N.Z.

REGIDRILLIA n. subgen. of *Austrodrillia.* Type: *A. (R.) sola* n. sp. Recent, N.Z.

TAHUDRILLIA n. gen. Type: *T. simplex* n. sp. (Tahuian) Upper Eocene, N.Z.

TAHUSYRINX n. gen. Type: *Parasyrinx finlayi* Allan. (Tahuian) Upper Eocene, N.Z.

VEXIGURALEUS n. gen. Type: *V. clifdenensis* n. sp. (Hutchinsonian) Lower Miocene, N.Z.

VEXITOMINA n. gen. Type: *Drillia metcalfei* Angas. Recent, New South Wales.

VIXINQUISITOR n. gen. Type: *Drillia vixumbilicata* Harris. (Balcombian) Middle Miocene, Victoria.

XANTHODAPHNE n. gen. Type: *Pleurotoma (Thesbia) membranacea* Watson. Recent, N.Z.

With regard to the subfamily names used herein, these are based automatically upon the earliest genus name covered by the group. Since the "International Rules of Zoological Nomenclature" are ambiguous on this point, it has always been my practice to apply family and subfamily names in the above manner rather than to recognise priority which after all is not demanded in the "rules." The forming of family and subfamily names upon the "type genus" as set down in the "rules" requires a further statement as to how this "type genus" is to be rigidly determined.

CLASSIFICATION.

No really satisfactory classification of the *Turridae* has yet been published, and, moreover, I cannot claim that even the scheme advanced in this bulletin has a completely sound basis. As already remarked, the paucity of available "live" material in a group amazingly rich in species is the reason for our deficiency in respect to anatomical data. Another adverse factor is that a high percentage of both genera and species are fossils.

The classification here advanced contains no novel features apart from the proposal of a larger number of subfamilies than previously employed, and the segregation of two groups as new non-Turrid families: these representing assumed parallel developed stock; and along with the other toxoglossids, probably all had a common ancestry.

Since shell features afford the only direct aid to the palaeontologist, it follows that a working scheme for the classification of the fossil members must be based upon these shell features. The protoconch, however, is something of an embryological criterion, since it represents the external covering of the embryo.

However, by analogies drawn from the available meagre knowledge of the radula and operculum, particularly of exotic species, the subfamilies as here outlined are given, for the most part, more definite biological status—they are something more than convenient shell groups, for they suggest natural assemblages.

As a brief resumé of previous classifications, attention is drawn to Stimpson's (1865) proposition of separating the *Clavatulinae* on radula data as a distinct family the *Clionellidae,* representing a new order, the Tomoglossata. Subsequent work, however, shows the radula of this group to be merely of intermediate style between the "prototypic" den-

tition of *Drillia* and *Spirotropis* on the one hand and on the other the specialised true toxoglossid radula of the higher Turrids. In 1868 Jeffreys introduced the form of the protoconch as a new systematic character for the British Turridae, i.e., "Genus 1. *Defrancia.* Apex somewhat stiliform (as in *Cerithiopsis*), finely pointed and minutely reticulated." "Genus 2. *Pleurotoma*—apex regular and blunt."

Fischer (1887) advanced the following proposition based solely on the operculum:—

"1. Opercule droit, étroit, unguiforme : **Coninae.**
2. Opercule piriforme, à nucléus latéral interne : **Clavatulinae.**
3. Opercule oval, à nucléus apical : **Pleurotominae.**
4. Pas d'opercule : **Mangiliinae.**

Most subsequent authors slavishly followed Fischer's clasification, but with unsatisfactory results, since the operculum is one of the least known of Turrid characters, and further, as I have attempted to demonstrate herein, the style of the operculum appears largely dependent upon the method employed by the animal to best fill the various apertural shapes. In particular, Fischer's *Clavatulinae* has caused a stumbling block, since the operculum with a medio-lateral nucleus was its only obvious feature for recognition. Hedley (1922) amplified Fischer's arrangement by correlating nuclear and shell characters, recognising four subfamilies—the *Turrinae, Clavatulinae, Mangiliinae* and the *Daphnellinae.*

Thiele (1929) in his great work Handbuch der Systematischen Weichtierkunde, proposed a novel classification, allocating three subfamilies for the *Turridae* — the *Turrinae, Brachytominae* and *Cytharinae;* prime importance being placed upon the nature of the basal attachment of the radula teeth, expressed as with or without a basal membrane. This grouping presents many apparently incongruous associations, and to my way of thinking amalgamates under one subfamily heading three out of four of the only clear-cut radula types in the family. That is: (1) The "wishbone"-shaped marginals of *Turris* and *Gemmula.* (2) The massive marginals and narrow-based unicuspid central of *Clavatula* and its allies, and (3) The strong marginals and large broad-based unicuspid central of *Leucosyrinx* and its relatives. Further, the *Drillia*-like genera which are easily recognisable by their truncated canal and "U"-shaped shoulder sinus become sundered, some in the *Turrinae,* others in the *Brachytominae,* while obvious *Turrinae* such as *Bathytoma* are likewise removed from their more natural location.

To return to the scheme adopted in this bulletin, it embodies all the usable features of prior classifications, but stresses shell features as the only general means at present available of arranging the family seemingly on phylogenetic lines. The recognition of a larger series of subfamilies and above all the subordination of the "Clavatulid operculum" bugbear should make for a more workable classification.

EVALUATION OF TAXONOMIC CHARACTERS.

(a) The radula:—

The most important fact emerging from Thiele's work on Turrid dentition is that whereas many of the genera which we may take as advanced have a normal toxoglossid radula very similar to that of the *Conidae,* others, particularly *Drillia* and *Spirotropis,* exhibit a presumed prototypic radula in which a central tooth and laterals have persisted as well as the marginals. It may well be that the long ranging genera are those most likely to retain the prototypic radula, and those more recently evolved have the specialised toxoglossid dentition. The radula of far too few species is known, however, to venture any sweeping conclusion based upon the known radula results. Certainly these two styles of Turrid dentition do not seem to correlate with clasifications based upon shell features.

(b) The protoconch:—

The next taxonomic character worthy of consideration is the protoconch, and undoubtedly we have here a generally useful character, but one of far greater value in the separation of phylogenetic units than in their major grouping. In one application only is the protoconch an index to a subfamily, and that is in the case of the diagonally cancellated Daphnellid apex. This apex is not essential to the *Daphnellinae*, however, but on the other hand it is unknown in the other subfamilies.

In general, a conical polygyrate protoconch indicates a free swimming larva, and such types are likely to have a wide geographic range as well as a considerable time range. In other words, efficient distribution is against the evolution of local races, and so the tendency to split up into regional forms is minimised. Some of these polygyrate protoconchs are of perfect "Sinusigera" form; that is, the outer lip of the embryonic shell is fitted with a claw-like projection which has been interpreted as a support for the velum or swimming organ of the veliger larva. (See Iredale 1910, p. 74, and 1911, p. 319, for account of the sinusigera apex.) A blunt paucispiral protoconch, on the other hand, is characteristic of most of the locally distributed types, in which there is no efficient free swimming stage, and in such the distribution cannot be wide. A certain number of genera appear to occur in parallel series, being alike in adult shell features and evidently of common origin, but by their respective protoconchs they are separable into polygyrate and paucispiral series. In all these instances I have treated these parallel developments as distinct genera, for differences in the embryo are surely of basic biological importance. Moreover, investigation shows that in such parallel groups each has its own phylogenetic time range, and that the polygyrate series usually outlives the paucispiral series. This is a significant point, for when once the radical embryonic change from a sedentary to a free swimming larva takes place, both types appear to develop independently, for there is no evidence suggesting indiscriminate change and rechange between these two types of embryos. It would seem rather that the "Sinusigera" apex is an evolutionary culmination from the less efficient paucispiral type.

Much criticism has been levelled at the employers of protoconch criteria in the family, but in all these objections the fault seems to lie in the failure of rigid application of these criteria. If we refuse to admit more than one style of protoconch in a genus these anomalies disappear, and in justification of this, I may state that the application of this rule in respect to the extensive fauna of New Zealand Tertiary *Turridae* in particular, has been attended with satisfactory results.

Dall (1927, pp. 27-42) in describing some 42 new species of *Turridae* discounted the taxonomic value of the protoconch in statements which conflict strangely with his earlier excellent work on the gasteropod apex. In this paper Dall's method was to arrange his species in five groups according to style of protoconch, but he then proceeded generically to nominate them on adult facies, with the result that the same genus appeared under more than one nuclear group. The unhappy result of Dall's scheme can best be judged from the fact that 30 out of the 42 new species, respectively, were generically admitted with a query.

It is well to recall the considered statement of Dr. H. J. Finlay (1931, p. 19) "after a number of years' careful examination of gasteropod apices, I am fully satisfied, in spite of what several authors have written, that the protoconch is one of the most valuable criteria for systematic classification. Not only have I never found it to vary from type in a homogeneous genus, but I have also found it so generally constant that in my opinion considerable importance must be placed on it in determining lineage relationships. To the palaeontologist it is as important as the radula is to the malacologist, and should be given just as much consideration."

Finlay (1931, p. 9) suggested that the normal course of evolution in the gasteropod protoconch is from paucispiral calcareous to polygyrate calcareous, and paucispiral part calcareous and part horny to polygyrate horny.

(c) **The operculum:—**

The operculum is here considered of secondary importance as a taxonomic character. After all, its shape is consequent on the shape of the aperture, for opercular growth naturally takes the most convenient form to keep the apertural space occupied. Opercular growth is achieved by means of a logarithmic spiral, the addition of concentric rings, or the addition of excentric rings. The operculum of *Turbo* is a good example of a logarithmic coiled operculum. Turrid opercular growth is achieved by either concentric or excentric growth rings. Apertural shape therefore must decide in a measure the method employed. For species with a long narrow aperture, the operculum is lanceolate or leaf-shaped. Excentric growth with an apical nucleus is the obvious mechanical method of growth in these types. The *Clavatulids*, on the other hand, have a very different apertural shape, due to the lower median placing of the parietal angulation of the inner lip, which is occasioned by the suture extending higher over the preceding whorl. Thus by fan-wise excentric growth from a medio-lateral position the apertural space is best filled. A variation of the leaf-shaped operculum takes place where the aperture does not contract rapidly towards the anterior canal. The resultant squarish aperture is accommodated by an operculum in which the position of the nucleus may move over towards the outer lip in order to facilitate the mechanism of opercular growth.

Again, in some abyssal genera such as *Steiraxis* the operculum may become degenerate and remain permanently ovate, of small size, without subsequent growth accretions.

Obviously the operculum in the light of these considerations cannot be given a high taxonomic value. It will remain lanceolate or "Clavatulid" so long as that shape is decided by apertural features. At best the operculum is consequent to the shape of the aperture.

(d) **Shell features (sinus, anterior canal, etc.):—**

We are still confronted with the problem of major grouping and so external shell features become usable, and until the anatomy is better known offer the only feasible means of grouping, particularly as these obvious criteria, including the protoconch, must remain the only taxonomic aids in palaeontology.

On shell features two groups are at once separable—the subfamily *Turrinae* with the sinus on the peripheral keel (or in the case of *Turris* (s.s.) on a separate rib immediately above the peripheral keel), and the remainder which have the sinus on the shoulder. The *Daphnellinae* can be segregated by their angular reversed "L"-shaped sinus adjoining the suture, and, as already stated, the diagonally cancellated protoconch is confined to this subfamily, although it is not essential to it.

Further separation of the great bulk of Turrids with the sinus on the shoulder can now be made. The *Clavatulinae* is available for fusiform genera with a robust but moderately long canal and whorls coiled high on the preceding volutions. Unfortunately, the operculum does come in as the critical test for this group, the form being roughly ovate, with a medio-lateral nucleus. By contrast the *Turrinae* and *Clavinae* have leaf-shaped opercula with an apical nucleus. Fusiform genera with long tapering canals may be grouped as the *Turriculinae* and the *Cochlespirinae*, the latter being deep-water, with thin keeled shells and a distinctive radula. The *Conorbiinae* covers conic to biconic shells with a broad shallow sinus, and develops a deeply sinused anterior canal and ridge-margined fasciole.

The *Clavinae* includes a large number of genera combining a short truncated anterior canal and a well developed sinus on the shoulder.

The *Mangeliinae* covers a large group of small fusiform to ovate shells with a broad, often very shallow sinus, occupying the shoulder, apertural denticles present or absent, and frequently a gritty texture occasioned by a minute granular pattern. The anterior canal is short to moderate, and the operculum is absent. Except for this last feature some genera resemble small Drillias.

The *Borsoniinae* is employed for moderate sized fusiform shells with several distinct columellar plaits and includes the *Mitromorpha*-like shells and a number of other genera of small size resembling small Mitras and Pyrenids, having a broad shallow sinus occupying the shoulder, which is frequently very slight, and often with a series of weak plications within the outer lip.

Summarised, the usable taxonomic characters in the **Turridae** are considered to have the following values:—

SUMMARY OF TAXONOMIC CHARACTERS.

(1) Protoconch—Essential in the segregation of phylogenetic series, but of little value in major grouping except that a diagonally cancellated protoconch is restricted to the *Daphnellinae,* but its presence is not absolutely essential to that subfamily.

(2) Sinus—Position and style of sinus is the best guide to subfamily grouping.

(3) Operculum—Of limited application, as data is very incomplete, and especially as it is unavailable for fossils. It is useful, however, as a definite check to the *Clavatulinae,* which typically has an operculum with a medio-lateral nucleus. (Other genera, however, have opercula closely simulating it. The absence of the operculum in both the *Mangeliinae* and the *Daphnellinae,* is worthy of note.

(4) Columellar plaits—or plications and a very shallow broad sinus indicate the *Borsoniinae,* but some genera minus plaits are considered to belong here also (a temporary location).

(5) Anterior canal—its length of secondary value in separating *Drillias* from *Turriculids* and *Clavatulids.* There are long and short canalled *Turrinae,* however, as instanced by *Turris* and *Xenuroturris.*

(6) Anterior notch—useful in tracing phylogenetic series, the trend being from a simple un-notched state through a gradually deepening notch, culminating in a ridged upper margin and well developed fasciole. (See *Cryptoconus-Megasurcula* diagrams.)

(7) "Stromboid" notch—a weak to moderately strong indentation on the lower portion of the outer lip. Indicates the *Clavus* series of the *Clavinae.*

(8) Suture—indicates the *Clavatulinae* when it is wound high up, clasping a considerable area of the preceding whorl.

(9) Radula—at present of limited application in Turrid classification, as there is insufficient data available. The extremely useful character of this organ in respect to other gasteropod groups, however, indicates that when more Turrids are known anatomically the radula may provide a decisive factor in their classification.

SYSTEMATIC CLASSIFICATION.

(a) Subfamilies of the Turridae.

A. Shell reaching large size (up to 100 mm.).

Shell fusiform; mostly with a long slender canal.

1. Sinus on or adjacent to peripheral keel; deep, "V"-shaped. Operculum leaf-shaped with apical nucleus. Radula 1+0+0+0+1; marginals only, which are "wish-bone"-shaped *(Turris & Gemmula)* .... **TURRINAE**
2. Sinus on the shoulder, rounded, broad and of moderate depth, to narrow and rather deep. Operculum (typically) with the nucleus on one side; but evidently variable. Radula (typically) 1+0+1+0+1; marginals massive, bifid at base; central tooth very small. Shell with rounded or subangulate periphery........ **TURRICULINAE**
3. Sinus on the shoulder, rounded, broad and shallow to rather deep. Operculum variable. Radula 1+0+1+0+1; marginals strong, central tooth very large. Shell thin with sharply angled periphery. Deep water .... **COCHLESPIRINAE**
4. Sinus on the shoulder, rounded, shallow to moderate. Operculum constantly ovoid with a medio-lateral nucleus. Radula 1+0+1+0+1; marginals massive, central tooth minute or absent. Shell strong with stout canal, and whorls clasping high over preceding volutions. (Not represented in New Zealand) .... **CLAVATULINAE**

Shell conoid to biconic.

5. Sinus broad and shallow, occupying the width of the shoulder. Operculum absent in *Genota*. Radula 1+0+0+0+1; a pair of slender marginals *(Genota mitriformis)* **CONORBIINAE**

B. Shell of moderate size.

Shell with tall spire, but short anterior canal.

6. Sinus on the shoulder, moderate to deep, narrowly "U"-shaped, often rendered subtubular by a parietal tubercle. Operculum with apical nucleus. Radula in *Drillia*, prototypic, 1+1+1+1+1, but in other genera the central and lateral teeth have disappeared, leaving only a pair of marginals .... **CLAVINAE**

Shell fusiform, biconic or narrowly ovate.

7. Sinus on the shoulder ,broadly arcuate, slight to moderate. Operculum absent in *Borsonella*. Radula 1+0+0+0+1, marginals long and slender *(Borsonia ochracea* Thiele). Typically with pillar plications .... **BORSONIINAE**

C. Shell mostly of small size. Operculum always absent.

Shell fusiform, ovate or biconic; canal rather short.

8. Sinus on the shoulder, broadly arcuate, shallow; subtubular when restricted by a parietal tubercle. Radula 1+0+0+0+1; a pair of slender marginals. Surface of shell often granular. Outer-lip simple or variced and dentate within .... **MANGELIINAE**
9. Sinus adjoining suture, typically as a reversed or "mirror image" of an "L." Radula 1+0+0+0+1; a pair of slender curved marginals. The diagonally cancellated protoconch is restricted to this subfamily .... **DAPHNELLINAE**

(b) Keys to genera; grouped in subfamilies.

Genera represented in the New Zealand fauna are indicated by heavy type. A few foreign genera are included in the keys for comparison, in cases where some relationship or resemblance to New Zealand groups exists. These are indicated by lighter faced type.

Subfamily TURRINAE.

1. Shell narrowly fusiform, with produced anterior canal.
   - A. Sinus on peripheral keel.
     - Sinus deep and narrow.
       - Sinus rib flat and smooth .... LOPHIOTOMA
       - Sinus rib convex and gemmulate .... **GEMMULA**
     - Sinus openly "V" shaped.
       - Apex of sinus restricted to a smooth convex carina .... POLYSTIRA
       - Apex of sinus broader than carina, which is gemmulate .... **EOTURRIS**
       - Sinus on upper of two series of prickly nodules .... **ECHINOTURRIS**
     - Sinus rounded and broadly open, of moderate depth.
       - Shell thin. Periphery nodulous .... LUCERAPEX

B. Sinus not quite on peripheral carina; extending a little above.
Sinus bluntly triangular, its apex just above the peripheral nodules ...... **CAMPYLACRUM**

C. Sinus on smooth convex spiral ridge immediately above peripheral carina.
Sinus deep, narrow. Sinus rib convex, smooth .... TURRIS

2. Shell with tall spire, but truncated anterior canal.
Sinus deep and narrow, as in *Lophiotoma*.
Sinus rib flat and smooth .... XENUROTURRIS

3. Shell biconic with full, gradually tapered body-whorl; anterior canal not produced.
Sinus openly "V" shaped. Shell gemmulate, nodulose or fenestrate.
Protoconch polygyrate .... **BATHYTOMA**
Protoconch blunt and paucispiral .... **MICANTAPEX**
Sinus very broadly and shallowly "V" shaped.
Shell very small, fenestrate. Protoconch blunt, paucispiral .... **FENESTROSYRINX**

4. Shell *"Drillia"*-shaped, spire tall, base truncated, anterior canal deeply notched with ridge margined fasciole.
Sinus narrow and deep, on rounded peripheral angle .... EPIDIRONA

Subfamily TURRICULINAE.

Shell narrowly fusiform, with rounded or subangled periphery.

A. Protoconch paucispiral.
Subsutural cord weak.
Protoconch large and bulbous .... **COMITAS**
Protoconch more depressed with last whorl carinate .... **CARINACOMITAS**
Subsutural cord absent.
Protoconch dome-shaped, strongly carinate. Canal long, slender .... **PARACOMITAS**
Protoconch very depressed, sharply carinate. Canal short, stout .... **ANTICOMITAS**

B. Protoconch papillate of 3 whorls, tip planorbid.
Subsutural cord broad and strong.
Sinus deep and narrow .... TURRICULA

C. Protoconch polygyrate, dome-shaped, of 3½ whorls.
Subsutural and peripheral cords nodulose.
Sinus deep and narrow, on smooth area between subsutural and peripheral cords
THOLITOMA

D. Protoconch polygyrate, sharply conic, of 3-5 whorls.
Subsutural cord broad, moderately strong.
Whorls increasing normally .... **INSOLENTIA**
Whorls rapidly increasing and drawn out .... **ZEMACIES**

Subfamily COCHLESPIRINAE.

1. Shell narrowly fusiform, with sharply keeled periphery.

A. Peripheral keel smooth.
Sinus deep, rather narrowly rounded.
Protoconch large, paucispiral, smooth and blunt .... **PARASYRINX**
Protoconch obtusely conical, of 2½ whorls, tip smooth, followed by 2 spirally lirate whorls
LIRASYRINX

Sinus broad and shallow.
Surface regularly finely striated .... COCHLESPIRA

B. Peripheral keel moniliform.
Sinus deep, broadly arcuate, occupying shoulder .... **COSMASYRINX**

C. Peripheral keel serrated.
Sinus deep, rather narrowly rounded .... **TAHUSYRINX**
Sinus subsutural; shoulder bisected by lamellar ridge having a pseudo-sinus below it
ANCISTROSYRINX

2. Shell narrowly fusiform, with angled periphery.

D. Peripheral angle with feeble axials.
Sinus broad and shallow, occupying the shoulder .... LEUCOSYRINX

Note: The operculum in this subfamily is quite variable, having an apical nucleus in *Ancistrosyrinx;*

subovate with a median rib on the inner edge and an apical nucleus in *Leucosyrinx;* elliptical and concentric with a subcentral nucleus in *Irenosyrinx;* while in *Steiraxis* the operculum remains permanently paucispiral.

In the absence of radula and opercular details, the thin fusiform shell, with sharp, sometimes frilled, peripheral keel is a guide. The subfamily is widespread in deep water and has a long Tertiary range. The *Turrinae, Clavatulinae, Turriculinae* and *Cochlespirinae* could well have had a common ancestry far back in the Cretaceous.

Subfamily CLAVATULINAE.

1. Shell fusiform with moderately long but stout anterior canal.
   - A. Suture mounting high on preceding whorls.
     - Sinus moderately deep, on shoulder, below subsutural fold.
       - Shell coarsely axially and spirally sculptured .... CLAVATULA
       - Shell almost smooth; base bluntly angulate .... PERRONA
   - B. Suture normal, not high and clasping.
     - Sinus moderately deep.
       - Shell coarsely axially and spirally sculptured .... KNEFASTIA
     - Sinus broad and shallow.
       - Shell smooth and polished. Like a short-spired *Terebra* .... PUSIONELLA
2. Shell *Drillia*-like, with short anterior canal.
   - Sinus shallow, shoulder not prominent.
     - Sculpture mainly axial .... CLIONELLA

Note: There are no New Zealand members of this subfamily.

Although much has been made of the "operculum with a medio-lateral nucleus," it is not an infallible index to the *Clavatulinae,* for it may be approximated in the *Turriculinae* and the *Cochlespirinae* as well. I would base the family rather on the curious whorling (i.e., suture clasped high on preceding whorl) coupled with a distinctive radula of massive marginals and a narrow-based tiny unicuspid central tooth. The additional evidence of a medio-lateral operculum to either the sutural or the radula factor, preferably both, should then be conclusive. *Clionella* lacks the clasping suture and the anterior canal is abnormally short, but both the operculum and the radula are unmistakably Clavatulid.

The family is now predominantly African, the one exception being the Southern Californian *Knefastia.* However, the family is well represented in the Tertiary by European and Asiatic species of *Clavatula* and *Perrona,* while in the West Indian region *Knefastia* is represented in the Miocene and possibly in the Cretaceous. At present it would be better to restrict the use of the *Clavatulinae* as outlined above and to use opercular characters with extreme caution, for what more unnatural grouping could there be than to force *Irenosyrinx* (an obvious member of the deep-water syrinx group of genera) into the *Clavatulinae* simply because it has an elliptical operculum with a subcentral nucleus.

Doubts have frequently been expressed regarding the Turrid affinity of *Pusionella nifat* (Adanson), it being held by some to be a short *Terebra.* The colour pattern of dark square blotches as well as the smooth polished surface certainly suggests this location, but on the other hand *nifat* has a weak sinus, which *Terebra* never has, the radula is definitely Clavatulid, as also is the operculum with its medio-lateral nucleus; all the Terebrid opercula being leaf-shaped with an apical nucleus. Further, the characteristic basal columellar fold of the Terebrids is quite lacking in *nifat.*

Pseudomelatoma Dall, 1918, is considered by Grant & Gale (1931, p. 559) to be a descendant of *Clavatula,* but I cannot concur in this view, for neither the suture nor the operculum, which is leaf-shaped with an apical nucleus, correlates with the *Clavatulinae.* Certainly in form the shell resembles *Clionella,* but the radula with its large central tooth having a single long cusp, and the simple elongate marginals, bears no resemblance to the Clavatulid radula which is one of the few really distinctive types so far known in the family. *Pseudomelatoma* is therefore a problematic genus which may be better placed in the *Turriculinae,* a purely provisional location, for there is little resemblance between the radula of *P. moesta* (as figured by Thiele 1925, p. 205) and that of *Turricula javana* (Thiele 1925, p. 204), which has a small but broad central tooth with a weak cusp and winged upturned extremities.

The nearest approach to the *Pseudomelatoma* radula is shown in a specimen of *"Turricula" maculosa* (Sowerby) from La Paz, West Mexico. It likewise has a broad central tooth with a large cusp and simple elongate marginals. The operculum also is leaf-shaped, with an apical nucleus. On shell characters, however, there would appear little relationship between *moesta* and *maculosa.* Certainly *maculosa* cannot be retained as a *Turricula* (s. str.) as neither the radula nor the operculum coincide, nor is the protoconch similar. Generic nomination, however, is withheld until the radulae of the Turriculids is better known.

Subfamily CONORBIINAE.

1. Shell *"Conus"*-shaped.
   A. Anterior canal unnotched.
      Spire only half height of aperture.
         Protoconch conic of 3 smooth whorls.
            Post-nuclear sculpture a network of spiral cords and axial growth lines .... CONORBIS

2. Shell biconic.
   Spire and aperture subequal.
      Protoconch of 2½ smooth papillate whorls.
         Post-nuclear sculpture spiral; axials absent .... CRYPTOCONUS
      Protoconch broad depressed of 1½ smooth whorls.
         Post-nuclear sculpture dense axial and spiral .... BELATOMINA

   Body-whorl long and slowly tapered. .... GENOTA
      Sinus restricted by broad subsutural fold.................................. NOTOGENOTA
      Sinus broad, shallow. Suture not margined.................................

   B. Anterior canal shallowly notched.
      Axial sculpture dominant.
         Protoconch of 4 whorls, tip planorbid, smooth except for spiral cords on last whorl
         ACAMPTOGENOTIA

   C. Anterior canal deeply notched.
      Axial sculpture dominant.
         Protoconch of 4-5 whorls, tip minute and globular, smooth, last 2 whorls reticulated
            by thin spirals and stout axials .... BELOPHOS

   D. Anterior canal deeply notched and ridge-margined.
      Spire equal to or less than height of aperture.
         Spiral sculpture dominant.
            Protoconch 4-5 whorls as in *Belophos*, except that the last 2 whorls have strong
               spirals crossed by thin axials.................................... AUSTROTOMA
            Protoconch large, smooth, rounded, of 1½ whorls, followed by brephic axials
            LIRATOMINA

         Sculpture weak. Shell very large.
            Protoconch? .... MEGASURCULA
      Spire twice height of aperture.
         Sculpture spiral and axial .... VEXITOMINA

3. Shell fusiform with moderately long unnotched or very weakly notched anterior canal and slightly twisted pillar.
   Sinus regularly concave.
      Protoconch polygyrate dome-shaped with strong spiral cords on last whorl
      MARSHALLARIA

   Sinus very shallow.
      Protoconch polygyrate, regularly conic and practically smooth .... MARSHALLENA

Subfamily CLAVINAE.

1. Fasciole very prominent, causing a deep false-umbilicus. Parietal callus heavy. Anterior canal deeply notched. Radula prototypic, 1+1+1+1+1, marginals, laterals and central all present .... DRILLIA

2. Fasciole moderate, without a false-umbilicus. Radula typically toxoglossid, 1+0+0+0+1, only the marginals remaining.
   A. Axial sculpture dominant.
      Anterior canal abnormally long for subfamily; weakly notched.
         Axials long and fold-like.
            Strong parietal callus-pad.
               Protoconch polygyrate of about 5 whorls.
                  Axials regular throughout.. INQUISITOR
                  Axials plus heavy varix behind aperture .... CLATHRODRILLIA
               Protoconch paucispiral, blunt, of 2½ whorls .... PSEUDOINQUISITOR
            No parietal callus-pad.
               Protoconch paucispiral, blunt, of 2 whorls; 1st smooth, 2nd spirally ridged
               ANTIMELATOMA

aa. Anterior canal very short, distinctly notched; termination more or less in line with axis of shell.

Strong parietal callus-pad.

Axials long and fold-like.

Subsutural fold very wide and massive.

Protoconch paucispiral followed by axial riblets .... CRASSISPIRA

Subsutural fold very weak.

Protoconch of two elevated smooth whorls .... AUSTRODRILLIA

Protoconch broad, dome-shaped, of 2½ whorls, last carinate .... **REGIDRILLIA**

Axials rendered strongly nodulous by spiral cords.

Subsutural fold weak.

Protoconch paucispiral, followed by axial riblets .... MONILISPIRA

Subsutural fold subobsolete.

Protoconch tall, conical, of 3½ smooth whorls .... **CLAVATOMA**

No parietal callus-pad.

Axials obsolete over body-whorl.

Protoconch smooth, dome-shaped, of 1½ whorls.

No subsutural fold .... **TAHUDRILLIA**

ab. Anterior canal termination very oblique. Outer lip interrupted below by a distinct "Stromboid"-notch.

Spiral sculpture very weak, obsolete, or confined to neck.

Parietal callus-pad moderate to strong.

Protoconch polygyrate.

Axials strong, tubercular or spiny; confined to periphery.

Protoconch tall, smooth and subulate .... CLAVUS

Protoconch polygyrate, a "Sinusigera" of 4-5 smooth whorls .. **AUSTROCLAVUS**

Protoconch blunt, paucispiral.

No subsutural fold. Base subangulate (in Austral species).

Axials narrow, extending from suture to suture .... **SYNTOMODRILLIA**

Axials reduced to pointed peripheral tubercles .... **HAUTURUA**

Subsutural fold usually present. Base not angulate.

Axials stopped at shoulder................................. **SPLENDRILLIA**

Axials very strong, those on base deeply incised in line with "Stromboid"-notch .... CYMATOSYRINX

B. Spiral and axial sculpture equally well developed.

Parietal callus-pad absent.

Protoconch globular of 2 smooth whorls................................. **MAUIDRILLIA**

Protoconch papillate of 2-3 whorls, developing a blunt submedian carina .. **AOTEADRILLIA**

C. Spiral sculpture dominant.

ca. Strong, distant cords or keels; smooth or weakly crenulate.

Sinus "U"-shaped, on shoulder, moderately deep.

Protoconch polygyrate; a "Sinusigera" of 4-5 whorls .... **TOMOPLEURA**

Protoconch paucispiral; broad, dome-shaped of 2 whorls .... **MAORITOMELLA**

Protoconch paucispiral; blunt, keeled, of 2½ whorls .... DRILLIOLA

Sinus area sunken between heavy subsutural and peripheral keels.

Protoconch polygyrate of 5 whorls; tip smooth, remainder regularly axially costate **MICRODRILLIA**

Sinus area with a strong median cord.

Protoconch turbinate, of 2 smooth whorls, followed by 1 of strong axials .... **TURRIDRUPA**

cb. Linear spaced, flattened spiral cords.

Sinus very shallow. Shell narrowly fusiform, of Pyrenid shape .... **MITRELLATOMA**

cc. Subsutural border and other cords rendered moniliform by axial riblets.

Anterior notch deep and ridge-margined.

Sinus deep. Protoconch of 4 tightly coiled whorls .... **PHENATOMA**

Subfamily BORSONIINAE.

1. Columella with plaits.

A. Shell fusiform, of moderate size.
Anterior canal long.
Columella with 1-2 plaits.
Sinus deep, on deeply excavated shoulder.
Columella with 1 strong plait .... BORSONELLA
Sinus broad, moderate, on weakly excavated shoulder.
Columella with 1 (typically) or 2 plaits .... BORSONIA
Columella with a series of plaits.
Sculpture gemmulate.
Protoconch of $2\frac{1}{2}$ low conic whorls .... SCOBINELLA
Sculpture of blunt axials crossed by linear grooves.
Protoconch tall, conic, of 5 whorls .... EOSCOBINELLA
Anterior canal short.
Sinus very broad and shallow; shoulder scarcely defined.
Columella with 2 plaits .... CORDIERIA

B. Shell biconic, small. Sinus very shallow.
Columella with 1-2 plaits (normally 2).
Shoulder rounded, ill defined.
Protoconch paucispiral, dome-shaped.
Sculpture of strong spirals, sometimes crossed by weak axials .... MITRITHARA
Sculpture of strong axials, cut by linear grooves .... ITIA
Shoulder prominently ridged.
Protoconch paucispiral, narrow, peg-like .... VEXITHARA

2. Columella without plaits.
Inside of outer lip lirate .... MITROMORPHA

A. Shell ovoid, small. Sinus subobsolete.
Strongly axially costate. Subsutural cord very strong. Shoulder deeply concave .... AWATERIA
Sculpture not strong. Subsutural cord subobsolete. Shoulder and sinus area ill defined
SCRINIUM

B. Shell very small, narrow, Pyreniform. Sinus very shallow.
Protoconch paucispiral, of $1\frac{1}{2}$ smooth whorls, tip inrolled and askew .... MAORIMORPHA
Protoconch paucispiral, very blunt, mammillary.......... THESBIA
Protoconch conoid, polygyrate, of $4\frac{1}{2}$ smooth whorls .... EOTHESBIA

Subfamily MANGELIINAE.

1. Outer lip thin; no apertural denticles.
A. Shell elongate-fusiform.
Protoconch polygyrate, dome-shaped, smooth.......... GURALEUS
Protoconch polygyrate, dome-shaped, tip smooth, remainder fenestrate.
Anterior canal truncated .... NEOGURALEUS
Anterior canal produced .... FUSIGURALEUS
Protoconch blunt, dome-shaped, tip smooth, remainder with thin curved axials, crossed
on last $\frac{1}{2}$ whorl by 4 weak spirals .... VEXIGURALEUS
Protoconch paucispiral, papillate, smooth.......... ANTIGURALEUS
Protoconch paucispiral, loosely wound, with heavy spiral keels .... LIRACRAEA
B. Shell ovate, with short spire.
Protoconch polygyrate, dome-shaped, smooth .... MARITA

2. Outer lip variced, with or without apertural denticles.
A. Sculpture of prominent spiral cords.
Parietal tubercle strong.
Apertural denticles absent.
Sinus deep, subtubular.
Protoconch blunt, dome-shaped, of 2 smooth whorls .... FILODRILLIA

B. Sculpture of strong axials crossed by secondary spirals.

Parietal tubercle subobsolete.

Apertural denticles absent.

Sinus shallow.

Protoconch paucispiral, turbinate, smooth, followed by brephic axials ANACITHARA

Parietal tubercle strong.

Apertural denticles on inside of outer-lip only.

Sinus broad, moderately deep.

Protoconch polygyrate, conical, axially costate .... HETEROCITHARA

Sinus deep, subtubular.

Protoconch large, polygyrate, 5-6 whorls, carinated .... ETREMOPSIS

Apertural denticles or ridges on both lips.

Shell ovate-cylindrical. Spire usually shorter than aperture.

Sinus excavated or channelled.

Protoconch paucispiral, small, smooth, helicoid .... EUCITHARA

Shell biconic; spire higher than aperture.

Sinus deep, subtubular.

Outer-lip heavily variced but thin expanded edge.

Protoconch small, smooth, of 2½-3 whorls .... ETREMA

Outer-lip heavily and bluntly variced.

Protoconch of 3 whorls, strongly keeled. Apertural denticles and ridges very strong .... GLYPHOSTOMA

Protoconch of 2 whorls, 2nd with sharp thread on shoulder .... LIENARDIA

Protoconch paucispiral; lop-sided. Aperture trigonal, restricted. Apertural denticles fewer and stronger .... ACRISTA

Protoconch paucispiral; spirally grooved. Apertural denticles very few and very strong .... THETIDOS

Subfamily DAPHNELLINAE.

1. Sinus sutural, descending vertically and then sloping forwards almost at right angles, like a reversed or "mirror image" of an "L."

Protoconch polygyrate and diagonally cancellated.

Shell elongate-oval; body-whorl deep and full. Surface elaborately reticulated. Whorls rounded .... DAPHNELLA

Shell "Drillia"-shaped, with moderately long canal. Whorls strongly keeled ..CRYPTODAPHNE

Shell smooth except for subsutural gemmulate band .... EUBELA

Protoconch polygyrate, but with strong lamellate axials and inconspicuous diagonal interstitial lirae.

Sculpture openly fenestrate; canal long; sinus very deep .... VEPRECULA

Protoconch polygyrate, but smooth and polished.

Sinus quite shallow, very slightly drawn forward at suture. Whorls rounded ...... RUGOBELA

Protoconch conical, 3-3½ whorls, last 2 whorls with narrow curved axials.

Outer-lip sweeping forward in a wing-like expansion.

Shell large. Surface spirally striate; no axials .... XANTHODAPHNE

Protoconch paucispiral, blunt, with spirals dominant and transverse very weak interstitial lirae.

Sculpture openly fenestrate .... NEPOTILLA

Sculpture of simple axials .... STILLA

Sculpture of regular spiral cords .... ZENEPOS

Sculpture of dense axials and spirals .... ASPERDAPHNE

Sculpture of strong axials and spirals; gemmulate .... PHILBERTIA

2. Reversed "L"-sinus deflected at suture by heavy entering callus-pad so that it appears rounded and subtubular.

Sculpture of axials and spirals; rendered gemmulate.

Protoconch dome-shaped, lamellate axials dominating spirals of 2nd whorl PSEUDODAPHNELLA

Protoconch paucispiral, 2½ whorls, tip smoth and blunt, then spirally lirate with weak axial threads, last whorl openly diagonally cancellated .... KERMIA

Sculpture of heavy spiral keels.

Protoconch blunt, paucispiral, spirally lirate................................ EUCYCLOTOMA

3. Sinus as a very weak sutural excavation only.

Protoconch polygyrate and diagonally cancellated.

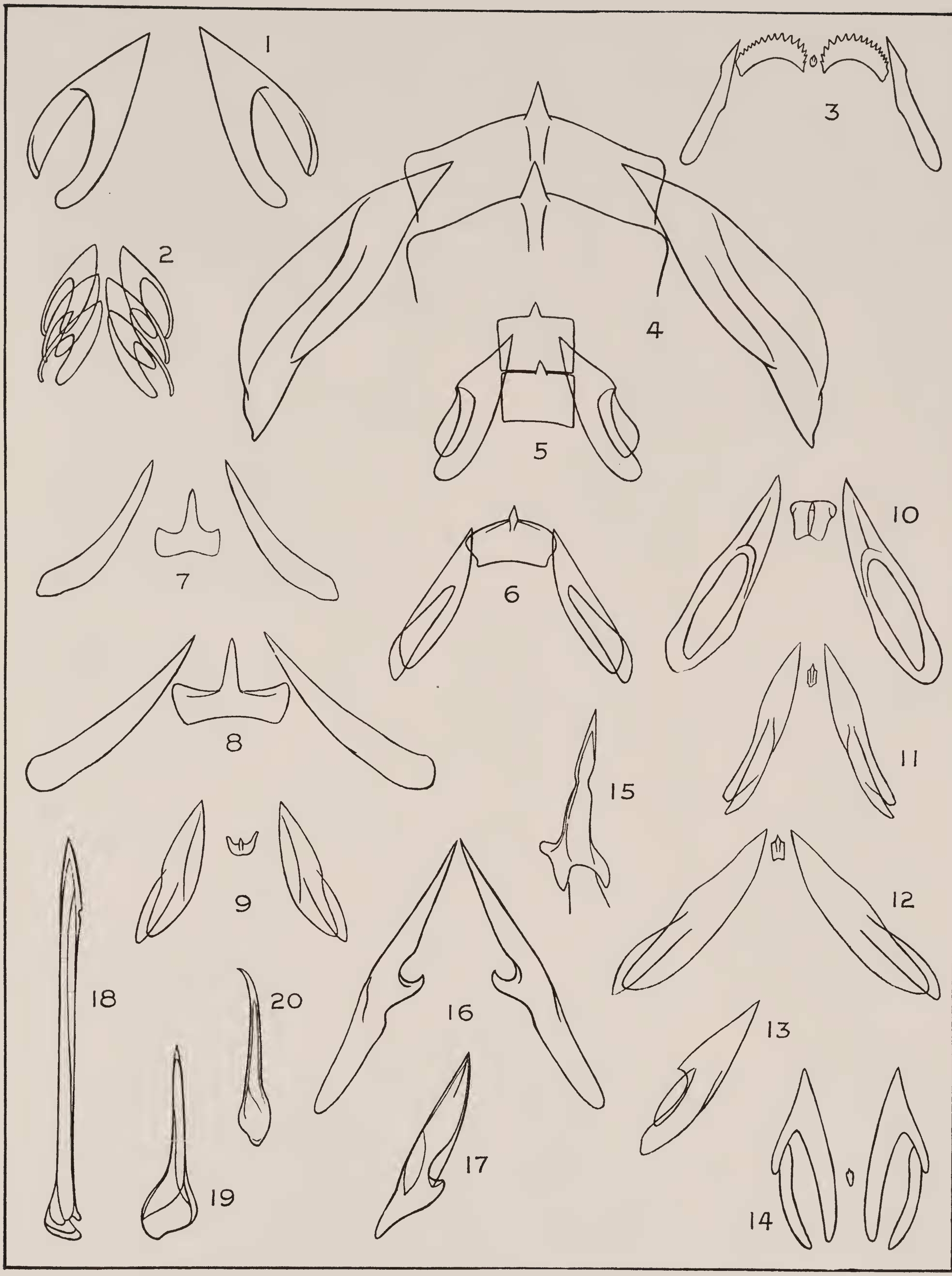
Sculpture of strong axials crossed by spiral cords. Whorls rounded .... **MAORIDAPHNE**

Axials stopped at concave shoulder. Weak pillar plications within aperture .... **PUHA**

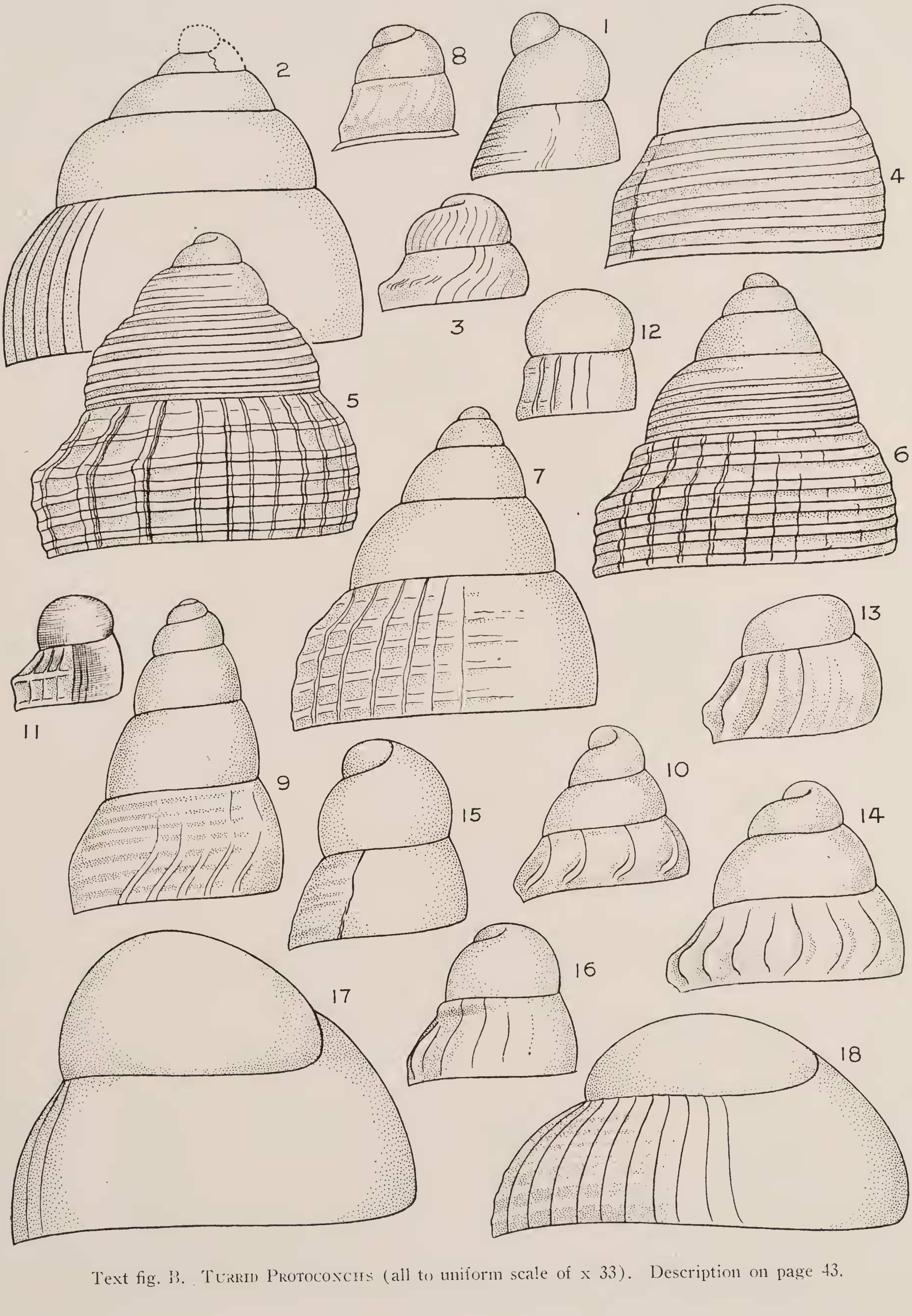
Protoconch blunt, paucispiral, dome-shaped, minutely punctate.

Shell cylindrical; spirally grooved .... TELEOCHILUS

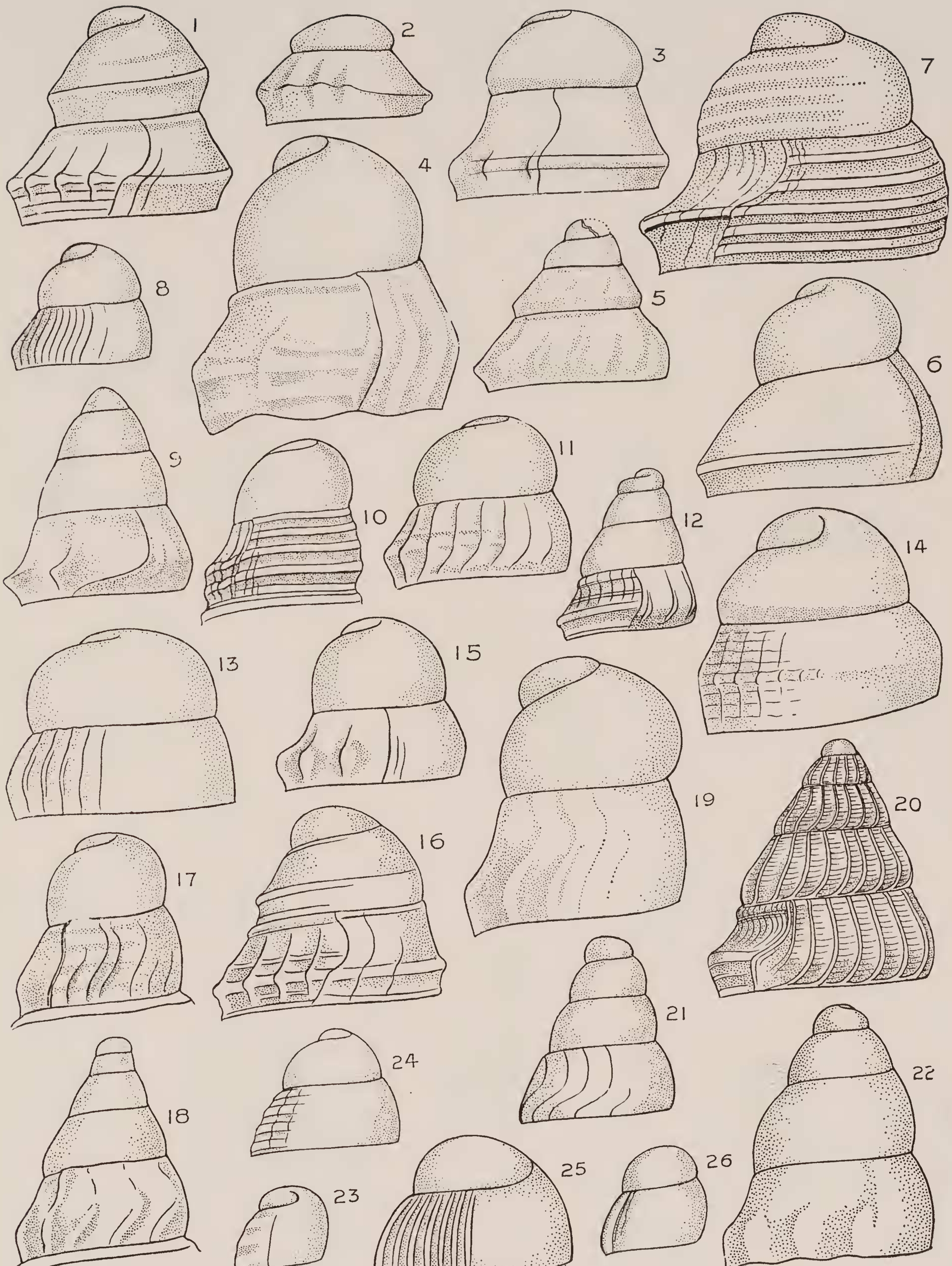
Note: Doubts expressed as to the Turrid affinity of *Teleochilus* are allayed by the presence of a definite sutural sinus in the allied Australian Recent genus, *Benthofascis*.



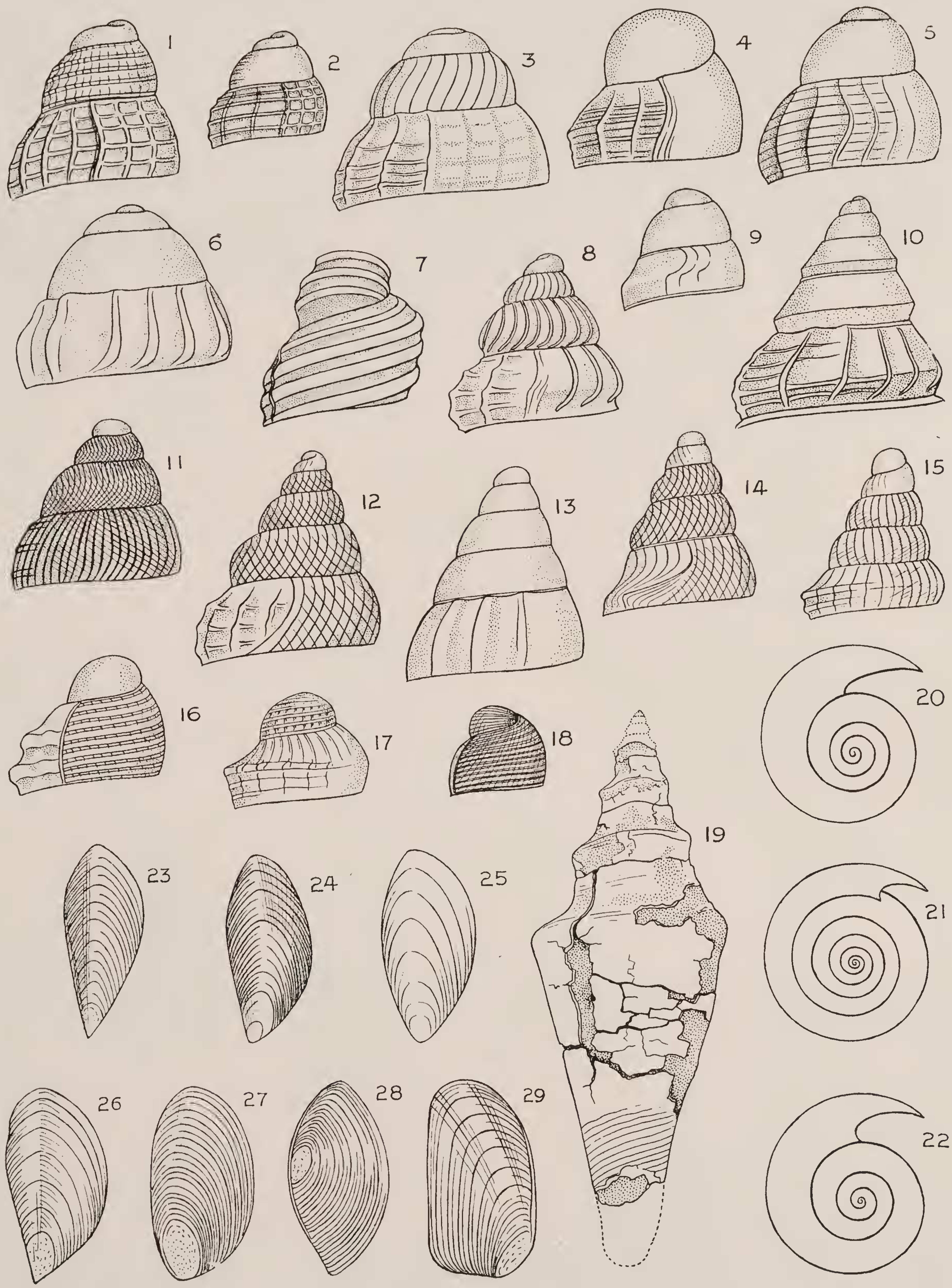
Text fig. A. Turrid Radulae (not to a uniform scale). Description on page 43.



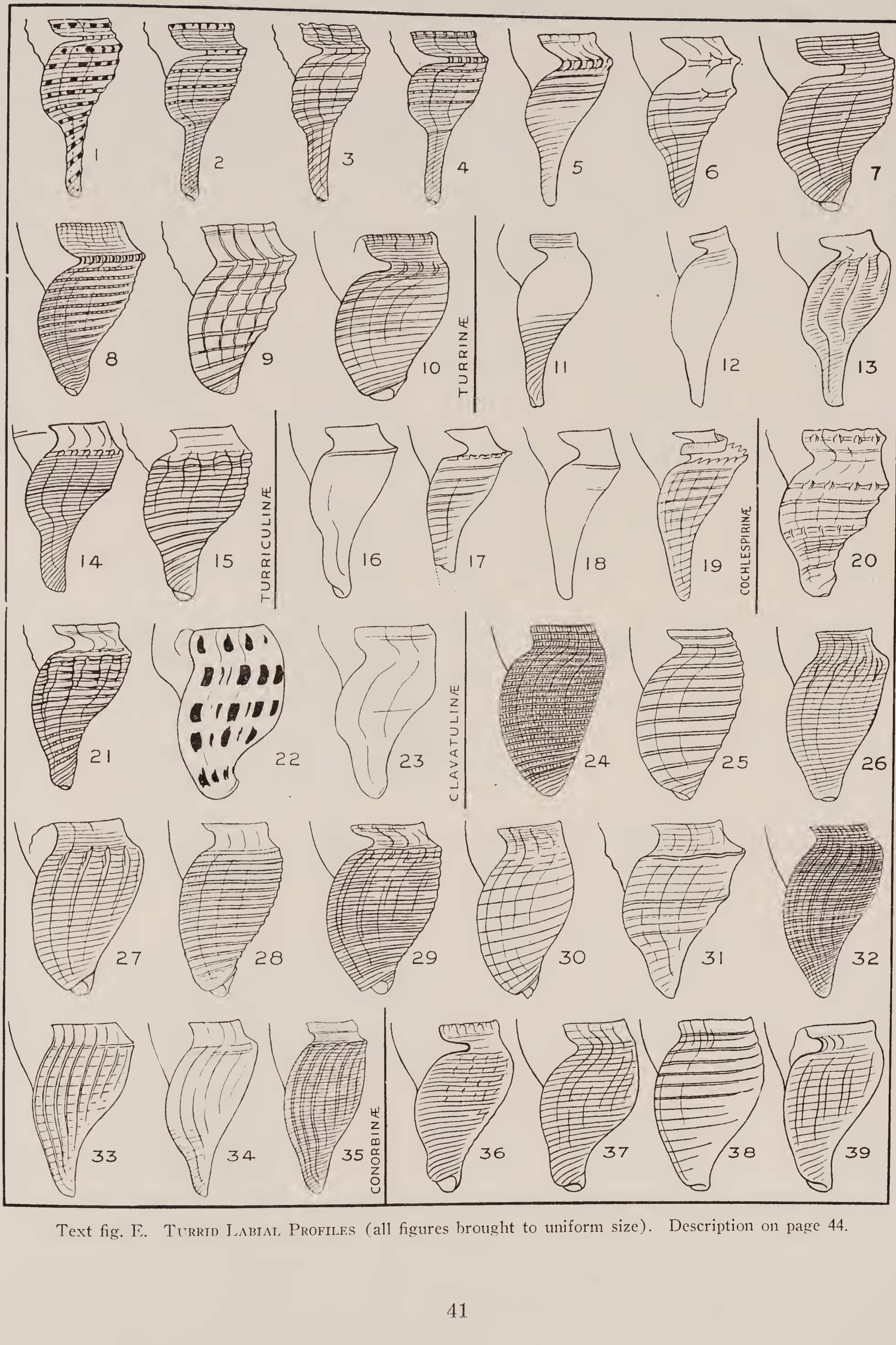
Text fig. B. Turrid Protoconchs (all to uniform scale of x 33). Description on page 43.



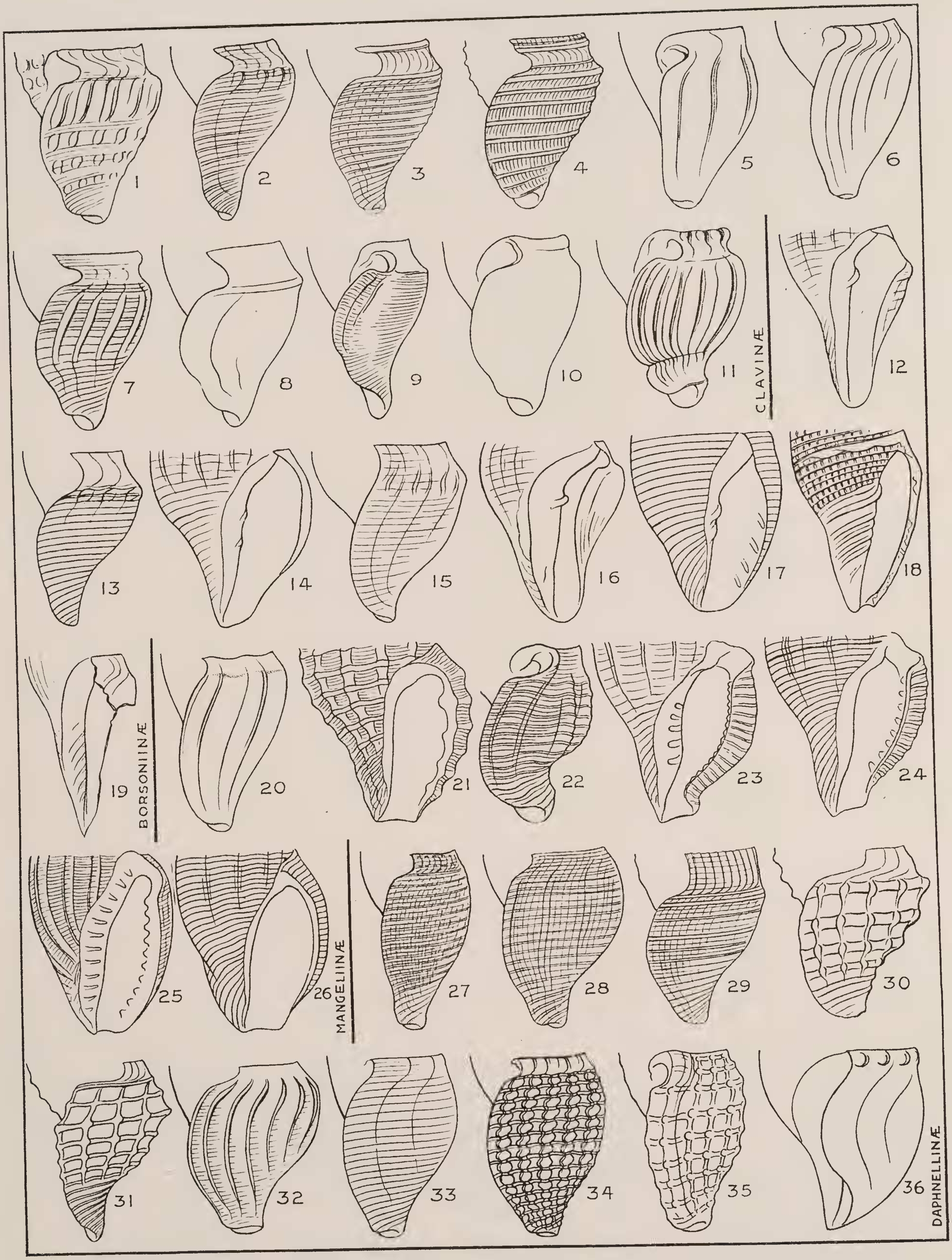
Text fig. C. TURRID PROTOCONCHS (all to uniform scale of x 33). Description on page 43.



Text fig. D. Turrid Protoconchs (all to uniform scale of x 33); opercula, etc. (not to scale).
Description on page 44.



Text fig. E. Turrid Labial Profiles (all figures brought to uniform size). Description on page 44.



Text fig. F. Turrid Labial Profiles (all figures brought to uniform size). Description on page 45.

Text. Figure A. **RADULAE** (not to scale; majority of figures copied, as indicated).

1. **Gemmula** sp. Stat. W.S. 742, Discovery II. Expd. 38° 22′ 5: 73° 41′ W. in 35 met.
2. **Turris babylonius** (Gmelin) Indo-Pacific (after Troschel & Thiele, Pl. 3, fig. 12).
3. **Drillia umbilicata** (Gray) West Africa (after Thiele 1931, p. 357).
4. **"Surcula" magnifica** Strebel. 500 metres Schollaert Channel, Palmer Archipelago, Antarctica (= **Leucosyrinx** s.l.).
5. **Ptychosyrinx bisinuata** (Martens) East Africa (after Thiele, 1929, p. 359).
6. **Leucosyrinx crispulata** Martens (after Thiele, 1931, p. 358).
7. **Pseudomelatoma moesta** (Carpenter) California (after Thiele, 1931, p. 358).
8. **"Turricula" maculosa** (Sowerby) La Paz, Mexico.
9. **Turricula javana** (Linné) East Indies (after Thiele, 1925, p. 204).
10. **Clavatula rubrifasciata** (Reeve) West Africa (after Thiele, 1925, p. 204).
11. **Perrona lineata** (Lamarck) West Africa (after Thiele, 1925, p. 204).
12. **Clionella sinuata** (Born) South Africa (after Thiele, 1925, p. 204).
13. **Pusionella nifat** (Brug.) North Africa (after Thiele, 1925, p. 204). (Central tooth absent.)
14. **Knefastia olivacea** (Sowerby) Gulf of California (after Thiele, 1925, p. 204).
15. **Daphnella cancellata** Hutton, N.Z. (after Thiele, 1931, p. 371).
16. **Neoguraleus murdochi** (Finlay) Devonport, Auckland.
17. **Benthomangelia trophonoidea** (Schepman) (after Thiele, 1931, p. 367).
18. **Phenatoma novaezelandiae** (Reeve) N.Z. (after Thiele, 1931, p. 364).
19. **Microdrillia optima** (Thiele) (**Acrobela**) East Africa (after Thiele, 1925, p. 204).
20. **Propebela turricula** (Mont.) Boreal (after Troschel & Thiele, Pl. 3, fig. 8).

Text Figure B. **PROTOCONCHS** (all to uniform scale of X33). (Gt. = Genotype.)

1. **Cryptoconus lineolatus** Deshayes. Eocene, France.
2. **Notogenota finlayi** Powell n. sp. Up. Eocene, N.Z.
3. **Waitara liratula** Powell n. sp. Lr. Pliocene, N.Z.
4. **Acamptogenotia intorta** (Brocchi) Piedmont, Miocene (Gt.).
5. **Marshallaria formosa** (Allan). Up. Eocene, N.Z.
6. **Austrotoma** cf. **minor** (Finlay). Mid. Miocene, N.Z.
7. **Marshallena neozelanica** (Suter). Up. Eocene, N.Z. (Gt.).
8. **Turricula javana** (Linne). N .Annam.
9. **Zemacies hamiltoni** (Hutton). Mid. Eocene, N.Z.
10. **Insolentia pareoraensis** (Suter). Mid. Miocene, N.Z. (Gt.).
11. **Fenestrosyrinx nexilis bicarinata** (Suter). Recent, N.Z. (Gt.).
12. **Echinoturris finlayi** (Powell). Mid. Miocene, N.Z. (Gt.).
13. **Micantapex angustatus** Powell. Recent, N.Z.
14. **Bathytoma bartrumi** Laws. Lr. Miocene, N.Z.
15. **Mitrellatoma angustata** (Hutton, 1886). Mid. Pliocene, N.Z. (Gt.).
16. **Integradrillia integra** (Ten.-Wds.). Mid. Miocene, Victoria (Gt.).
17. **Liratomina sculptilis** (Tate, 1888). Mid. Miocene, Victoria (Gt.).
18. **Belatomina pulchra** (Tate, 1888). Mid. Miocene, Victoria (Gt.).

Text Figure C. **PROTOCONCHS** (all to uniform scale of X33).

1. **Paracomitas castlecliffensis** (Marshall & Murdoch). Up. Pliocene, N.Z. (Gt.).
2. **Anticomitas vivens** Powell n. sp. Recent, N.Z. (Gt.).
3. **Comitas (Carinacomitas) clarae** (Ten.-Woods). Oligocene, Victoria (Gt.).
4. **Comitas fusiformis** (Hutton). Mid. Miocene, N.Z. (Gt.).
5. **Tahusyrinx finlayi** (Allan). Up. Eocene, N.Z. (Gt.).
6. **Parasyrinx alta** (Harris). Mid. Miocene, N.Z. (Gt.).
7. **Lirasyrinx anomala** Powell n. sp. Up. Oligocene, N.Z. (Gt.).
8. **Maoritomella albula** (Hutton). Recent, N.Z. (Gt.).
9. **Austroclavus finlayi** Powell n. sp. Lower Miocene, N.Z.
10. **Antimelatoma buchanani maorum** (Smith). Recent, N.Z. (Gt.).
11. **Mauidrillia praecophinodes** (Suter). Mid. Miocene, N.Z. (Gt.).
12. **Tomopleura excavata** (Hutton). Mid. Miocene, N.Z.
13. **Tahudrillia simplex** Powell n. sp. Up. Eocene, N.Z. (Gt.).
14. **Austrodrillia (Regidrillia) sola** Powell n. sp. Recent, N.Z. (Gt.).
15. **Splendrillia aoteana** Finlay. Recent N.Z..
16. **Aoteadrillia wanganuiensis** (Hutton). Up. Pliocene, N. Z. (Gt.).
17. **Pseudoinquisitor problematicus** Powell n. sp. Mid. Miocene, N.Z. (Gt.).

18. **Inquisitor awamoaensis** (Hutton). Mid. Miocene, N.Z.
19. **Vixinquisitor vixumbilicata** (Harris, 1897). Mid. Miocene, Victoria (Gt.).
20. **Microdrillia pakaurangia** Powell n. sp. Lr. Miocene, N.Z.
21. **Phenatoma novaezelandiae** (Reeve). Recent, N.Z. (Gt.).
22. **Clavatoma pulchra Powell** n. sp. Lr. Pliocene, N.Z. (Gt.).
23. **Maorimorpha suteri** (Murdoch). Recent, N.Z. (Gt.).
24. **Mitrithara alba** (Petterd). Recent, Tasmania.
25. **Itia regis** (Powell). Recent, N.Z.
26. **Vexithara nodosolirata** (Suter). Mid Miocene, N.Z.

Text Figure D. **PROTOCONCHS,** 1-18 (all to uniform scale of X33).

1 **Neoguraleus murdochi** (Finlay). Recent, N.Z.
2. **Neoguraleus (Fusiguraleus) leptosomus** (Hutton). Mid. Miocene, N.Z. (Gt.).
3. **Vexiguraleus clifdenensis** Powell n. sp. Lr. Miocene, N.Z. (Gt.).
4. **Antiguraleus otagoensis** Powell n. sp. Recent, N.Z. (Gt.).
5. **Guraleus tasmanicus** (Ten.-Wds.). N.S.W., Australia.
6. **Anacithara finlayi** Powell n. sp. Lr. Miocene, N.Z.
7. **Liracraea epentroma** Murdoch. Recent, N.Z. Gt.).
8. **Heterocithara mediocris** Odhner. Recent, N.Z.
9. **Etrema aliciae** (Melvill & Standen). Recent, Loyalty Is. (Gt.).
10. **Etremopsis erecta** Powell n. sp. Lr. Miocene, N.Z.
11. **Daphnella cancellata** Hutton. Recent, N.Z.
12. **Maoridaphne clifdenica** (Laws). Lr. Miocene, N.Z. (Gt.).
13. **Rugobela tenuilirata** (Suter). Mid. Miocene, N.Z. (Gt.).
14. **Cryptodaphne pseudodrillia** Powell n. sp. Lr. Miocene. N.Z. (Gt.).
15. **Veprecula cooperi** Mestayer. Recent. N.Z.
16. **Nepotilla vera** Powell. Recent, N.Z.
17. **Asperdaphne versivestita** (Hedley). Recent, N.S.W. (Gt.).
18. **Stilla flexicostata** Suter. Recent, N.Z. (Gt.).

SHELLS (not to scale).

19. **Notogenota pahiensis** Powell n. sp. Mid. Eocene, N.Z. 75 x 26 mm.
20. **Thatcheria mirabilis** Angas. Recent, Japan.
21. **Conus textile** Linn. Recent, Fiji.
22. **Waitara liratula** Powell n. sp. Lr. Pliocene, N.Z.

OPERCULA (all figures brought to uniform size).

23. **"Turricula" maculosa** (Sowerby). W. Mexico.
24. **Crassispira pluto** Pilsbry & Lowe. W. Mexico.
25. **Acteadrillia otagoensis** Powell n. sp. 50 f. Otago Heads, N.Z.
26. **Xenuroturris legitima** Iredale. Queensland.
27. **Tomopleura pouloensis** Jouss. Aden.
28. **Pusionella nifat** (Brug.). N. Africa.
29. **"Surcula" magnifica** Strebel. Palmer Arch., Antarctic.

Text Figure E. **LABIAL PROFILES, SHOWING SINUS** (all figures brought to uniform size).

1. **Turris babylonius** (Gmelin). Recent, Solomon Islands (Gt.).
2. **Lophiotoma acuta** (Perry) = **tigrina** (Lamarck) Recent Philippine Islands (Gt.).
3. **Polystira barretti** (Guppy). Miocene, Jamaica.
4. **Gemmula granosa** (Helbling). Recent, Japan.
5. **Eoturris complicatus** (Suter). Upper Eocene, N.Z. (Gt.).
6. **Echinoturris finlayi** (Powell). Mid. Miocene, N.Z. (Gt.).
7. **Xenuroturris cingulifera** (Lamarck). Recent, Japan.
8. **Bathytoma haasti** (Hutton). Mid. Miocene, N.Z.
9. **Fenestrosyrinx nexilis bicarinata** (Suter). Recent, N.Z. (Gt.).
10. **Epidirona hedleyi** (Iredale). Recent, N.S.W. (Gt.).
11. **Turricula flammea** (Schumacher). Recent, East Indies (Gt.).
12. **Zemacies elatior** Finlay. Lower Miocene, N.Z. (Gt.).
13. **Comitas fusiformis** (Hutton). Mid. Miocene, N.Z. (Gt.).
14. **Paracomitas castlecliffensis** (Marshall & Murdoch). Upper Pliocene, N.Z. (Gt.).
15. **Anticomitas vivens** Powell n. sp. Recent. N.Z. (Gt.).
16. **Cochlespira engonata** Conrad. Mid. Eocene, Texas (Gt.).

17. **Tahusyrinx finlayi** (Allan). Upper Eocene, N.Z. (Gt.).
18. **Parasyrinx alta** (Harris). Mid. Miocene, N.Z. (Gt.).
19. **Ancistrosyrinx radiata** Dall. Recent, West Indies.
20. **Clavatula asperulata** (Lamarck). Miocene, Southern Europe.
21. **Knefastia olivacea** (Sowerby). Recent, Gulf of California (Gt.).
22. **Pusionella nifat** (Bruguiere). Recent, North Africa (Gt.).
23. **Perrona jouanneti** (Desmoulins). Miocene, Southern Europe.
24. **Conorbis dormitor** (Sowerby). Eocene, Barton, England (Gt.).
25. **Cryptoconus filosus** (Lamarck). Eocene, France (Gt.).
26 **Acamptogenotia intorta** (Brocchi). Piedmont, Miocene (Gt.).
27. **Belophos woodsi** (Tate). Miocene, Tasmania (Gt.).
28. **Austrotoma minor** (Finlay). Mid. Miocene, N.Z.
29. **Vexitomina metcalfei** (Angas). Recent, N.S.W. (Gt.).
30. **Megasurcula carpenteriana** (Gabb.). Recent, California (Gt.).
31. **Surculites errans** (Solander). Eocene, Barton, England.
32. **Marshallaria spiralis** (Allan). Upper Eocene, N.Z. (Gt.).
33. **Marshallena neozelanica** (Suter). Upper Eocene, N.Z. (Gt.).
34. **Notogenota goniodes** (Suter). Mid. Eocene, N.Z. (Gt.).
35. **Genota ramosa** (Basterot). Miocene, Southern Europe.
36. **Phenatoma novaezelandiae** (Reeve). Recent, N.Z. (Gt.).
37. **Phenatoma? incisa ophioderma** (Dall). Recent, California.
38. **Mitrellatoma angustata** (Hutton). Mid. Pliocene, N.Z. (Gt.).
39. **Pseudoinquisitor problematicus** Powell n. sp. Mid. Miocene, N.Z. (Gt.).

Text Figure F. **LABIAL PROFILES, SHOWING SINUS** (all figures brought to uniform size).

1. **Clavatoma pulchra** Powell n. sp. Lower Pliocene, N.Z. (Gt.).
2. **Antimelatoma buchanani maorum** (Smith). Recent, N.Z. (Gt.).
3. **Microdrillia pakaurangia** Powell n. sp. Lower Miocene, N.Z.
4. **Tomopleura violacea** (Hinds). Recent, Arabian Sea.
5. **Austrodrillia angasi** (Crosse). Recent, N.S.W. (Gt.).
6. **Tahudrillia simplex Powell** n. sp. Upper Eocene, N.Z. (Gt.).
7. **Aoteadrillia wanganuiensis** (Hutton). Upper Pliocene, N.Z. (Gt.).
8. **Mauidrillia praecophinodes** (Suter). Mid. Miocene, N.Z. (Gt.).
9. **Austroclavus tenuispiralis** (Marshall). Lower Miocene, N.Z. (Gt.).
10. **Splendrillia aoteana** Finlay. Recent, N.Z.
11. **Cymatosyrinx lunata** (Lea). Pliocene, Florida (Gt.).

12 & 13. **Borsonia prima** Bellardi. Miocene, Italy (Gt.).
14 & 15. **Cordieria rudis** (Hutton). Upper Eocene, N.Z.

16. **Borsonella dalli** (Arnold). Pliocene-Recent, California (Gt., after Oldroyd).
17. **Mitrithara alba** (Petterd). Recent, Tasmania (Gt., after Hedley).
18. **Scobinella magnifica** (Gabb.). Miocene, Dominican Republic (after Woodring).
19. **Eoscobinella tahuia** Powell n. sp. Upper Eocene, N.Z. (Gt.).
20. **Guraleus pictus** (Adams & Angas). Recent N.S.W. (Gt.).
21. **Heterocithara bilineata** (Angas). Recent, N.S.W. (Gt.).
22. **Etrema aliciae** (Melvill & Standen). Recent, Loyalty Is. (Gt.).
23. **Etrema curtisiana** Hedley. Recent, Queensland (after Hedley).
24. **Etremopsis erecta** Powell n. sp. Lower Miocene, N.Z.
25. **Eucithara brocha** Hedley. Recent, Queensland (after Hedley).
26. **Anacithara naufraga** (Hedley). Recent, Queensland (Gt., after Hedley).
27. **Daphnella cancellata** Hutton. Recent, N.Z.
28. **Asperdaphne versivestita** (Hedley). Recent, N.S.W. (Gt.).
29. **Cryptodaphne pseudodrillia** Powell n. sp. Lower Miocene, N.Z. (Gt.).
30. **Veprecula cooperi** Mestayer. Recent, N.Z.
31. **Nepotilla vera** Powell. Recent, N.Z.
32. **Stilla flexicostata** Suter. Recent, N.Z. (Gt.).
33. **Rugobela tenuilirata** (Suter). Mid. Miocene, N.Z. (Gt.).
34. **Philbertia philberti** (Michaud). Recent, Mediterranean (Gt.).
35. **Kermia benhami** Oliver. Recent, Kermadec Is. (Gt.).
36. **Eubela limacina** Dall. Recent abyssal, Gulf of Mexico (Gt., after Dall).

TURRINAE.

Genus **Eoturris** Finlay & Marwick, 1937.

Type (o.d.) : *Turris complicatus* Suter. (Tahuian) Upper Eocene, N.Z.

This is a New Zealand genus ranging from the Matau fauna (Bortonian) Middle Eocene to the (Waitakian) Upper Oligocene; allied to *Gemmula,* but having a considerably broader sinus, spreading above the peripheral keel on the shoulder as in *Eopleurotoma* (from the Eocene of the Paris Basin). *Eopleurotoma,* however, is distinct in having a paucispiral protoconch, a short, gently twisted neck and usually a distinct fasciole. The protoconch of *Eoturris* is narrow, elongate-conic, with the axials restricted to the last ¼ whorl, instead of being numerous and spread over the last two or three whorls as in *Gemmula.*

Key to Species of Eoturris.

Axials oblique, extending slightly over base.
  Periphery bluntly rounded.
    Axials 11 per whorl .... *multicinctus (Marshall)

Axials restricted to periphery.
  Periphery slightly angulate.
    Axials 10-12 per whorl .... *neglectus (Suter)
  Periphery bluntly rounded.
    Axials 14 per whorl, rounded .... *complicatus (Suter)
    Axials 16 per whorl, "comma"-shaped .... *uttleyi (Suter)

Eoturris multicinctus (Marshall, 1917).

1917 *Turris multicinctus* Marshall, Trans. N.Z. Inst. 49, p. 456, Pl. 36, f. 34 (not Pl. 35, f. 32).
1937 *Eoturris multicinctus* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 115.

Holotype in Otago University Museum, Dunedin.
Locality: "Wangaloa" ? probably Castle Hill Shaft, Matau fauna (= Bortonian) Middle Eocene.

Eoturris complicatus (Suter, 1917).

1917 *Turris complicatus* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 45, Pl. 5, f. 14.
1917 *Surcula mordax* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 51 (non Martin, 1915).
1917 *Turris uttleyi* : Suter, N.Z. Geol. Surv. Pal. Bull. 5, Pl. 6, f. 3 (but not the holotype, f. 2).
1937 *Eoturris complicatus* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 115.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: McCullough's Bridge. (Tahuian) Upper Eocene.

Eoturris neglectus (Suter, 1917).

1917 *Turris neglectus* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 46, Pl. 6, f. 1.
1924 *Turris insensus* Finlay, Proc. Mal. Soc. 16, p. 103, nom. nov. for *neglectus* Suter, 1917; non *Pleurotoma neglecta* Reeve, 1842.
1937 *Eoturris insensus* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 115.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: "N.Z.G.S. loc. 630, Teaneraki, Enfield near Oamaru." Probably McCullough's Bridge. See Marwick N.Z. Journ. Sci. & Tech. 6 (5 & 6), p. 280. (Tahuian), Upper Eocene.

The removal of Suter's *neglectus* to *Eoturris* removes name conflict with Reeve's species, making Finlay's nom. nov. now unnecessary.

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*Denotes a fossil species.

Eoturris uttleyi (Suter, 1917).

1917 *Turris uttleyi* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 47, Pl. 6, fig. 2 (but not fig. 3).
1937 *Eoturris uttleyi* Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 115.

Holotype in Wanganui Public Museum.
Locality: Otiake, Waitaki Valley (Waitakian) Upper Oligocene.

Genus **Campylacrum** Finlay & Marwick, 1937.

Type (o.d.): *C. sanum* Finlay & Marwick. (Wangaloan) Upper Cretaceous, N.Z.

This is another member of the *Gemmula* assemblage, nearest to *Eoturris*, but of smaller size, different apex and twisted canal. So far it is known only from the Upper Cretaceous (Wangaloan). There is apparent relationship also with the Parisian Eocene *Oxyacrum* Cossmann; both have a small, conic, polygyrate protoconch, and a wide, moderately deep, bluntly triangular sinus, situated on the keel, with the apex of the sinus not encircling the peripheral nodules, but occurring immediately above them.

Campylacrum sanum Finlay & Marwick, 1937.

1937 *Campylacrum sanum* Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 86, Pl. 12, figs. 3, 4.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Wangaloa. (Wangaloan) Upper Cretaceous.

Campylacrum debile Finlay & Marwick, 1937.

1937 *Campylacrum debile* Finlay & Marwick N.Z. Geol. Surv. Pal. Bull. 15, p. 86, Pl. 12, figs. 1, 2.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Wangaloa. (Wangaloan) Upper Cretaceous.

Genus **Gemmula** Weinkauff, 1875.

Type (s.d. Cossmann 1896, p. 62): *Pleurotoma gemmata*. Recent, "Gulf of Magdalena, California," Indo-Pacific, according to Tryon (1884, p. 173).

=*Eugemmula* Iredale, 1931. Type (o.d.): *E. hawleyi* Iredale. Recent, New South Wales and Queensland.

Dall's *Cryptogemma* (1918, p. 318), based on a thin-shelled deep-water species with a greenish periostracum (from the Gulf of Panama to Ecuador, 812-1,360 fathoms) resembles the New Zealand Eocene narrow Gemmulas such as *polita* and *waihaoensis*. Unfortunately, all known examples of the genotype of *Cryptogemma* have the apex eroded and of the nine West American species ascribed to the genus by Dall (1921, pp. 70-71) all have been distributed elsewhere; *Cryptogemma* typical being synonymised with *Hemipleurotoma* (Grant & Gale 1931, pp. 570, 571).

When more is known concerning the genotype of *Gemmula*, Iredale's *Eugemmula* may prove preferable for the New Zealand members, but meanwhile the conventional usage of *Gemmula* is here continued. The New Zealand Gemmulas have a tall narrowly conic protoconch of 5-6 whorls, the tip smooth, but the following whorls with regular axials. The New Zealand range is (Bortonian) Middle Eocene to (Opoitian) Lower Pliocene.

Key to N.Z. Species of Gemmula.

1. Periphery bluntly angled; tuberculate.
    - Shell elongate-fusiform. Spire about 1½ times height of aperture.
        - Spire whorls (including shoulder) and base with numerous spiral threads.
            - Subsutural border bearing two smooth threads.
                - Tubercles 14-15 per whorl .... *reticulata* (Marshall)
                - Tubercles 18-24 per whorl .... *margaritata* (Marshall)
        - Shoulder smooth; strong, close spaced spirals below keel and on base.
            - Subsutural border a single gemmulate cord.
                - Tubercles 17 per whorl, sharp, on a double keel .... *polita* (Marshall)

Shoulder with weak spirals; wide-spaced spirals below keel and on base.
Subsutural border sparsely gemmulate, but no raised cord.
Tubercles 17-20 per whorl, blunt, laterally compressed .... **waihaoensis* Finlay
Shoulder with weak spirals; base with 3 strong wide-spaced spirals above, followed by wide-spaced threads.
Tubercles 15-16 per whorl, strong, pointed .... **longwoodensis* n. sp.

2. Periphery with strong projecting rounded tubercular collar.
Spire up to 1½ times height of aperture.
Base with 3 strong wide-spaced spirals, followed by weaker spirals.
Subsutural border plain.
Two close spaced cords forming carina.
Tubercles 17-20 per whorl .... **kaiparaensis* (Marshall)
Tubercles 30 per whorl .... **lawsi* n. sp.
Three close spaced cords forming carina.
Tubercles 22-24 per whorl .... **clifdenensis* n. sp.
Base with 8-9 close-spaced spirals.
Tubercles 24 per whorl .... **ornata* (Marshall)
Base with 2 wide spaced, strong spirals and weak intermediates.
Subsutural border moniliform.
Tubercles sharp, 16-18 per whorl .... **orba* Marwick
Base with 2 strong followed by 2 weak, wide spaced spirals.
Subsutural border plain.
Tubercles 16 per whorl .... **bimarginata* (Suter)
Base with 1 weak followed by 4 strong wide-spaced spirals.
Subsutural border gemmulate.
Tubercles 16 per whorl .... **duplex* (Suter)
Spire about twice height of aperture.
Subsutural gemmules subobsolete.
Tubercles 14 per whorl .... **disjuncta* Laws
Subsutural border plain.
Tubercles 16-20 per whorl .... **peraspera* Marwick

Gemmula margaritata (Marshall, 1919).

1919 *Turris margaritatus* Marshall, Trans. N.Z. Inst. 51, p. 230, Pl. 17, f. 2.

Holotype in Wanganui Public Museum.

Locality: Hampden. (Bortonian) Middle Eocene.

Gemmula reticulata (Marshall, 1919).

1919 *Turris reticulatus* Marshall, Trans. N.Z. Inst. 51, p. 231, Pl. 17, f. 8.

Holotype in Wanganui Public Museum.

Locality: Hampden. (Bortonian) Middle Eocene.

Gemmula polita (Marshall, 1919).

1919 *Turris politus* Marshall, Trans. N.Z. Inst. 51, p. 230, Pl. 17, f. 9.

Holotype in Wanganui Public Museum.

Locality: Hampden. (Bortonian) Middle Eocene.

Gemmula duplex (Suter, 1917).

1917 *Turris duplex* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 45, Pl. 5, f. 15.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: McCullough's Bridge; N.Z.G.S. loc. 479, Waihao River, South Canterbury. (Tahuian) Upper Eocene. (Dr. Marwick informs me that loc. 479 had a few Bortonian strays from up the river, so is best regarded as composite.)

Gemmula bimarginata (Suter, 1917).

1917 *Turris bimarginatus* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 44, Pl. 5, f. 13.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: "N.Z.G.S. loc. 630, Teaneraki, Enfield, near Oamaru." Probably McCullough's Bridge, see Marwick N.Z. Journ. Sci. Tech. 6 (5 & 6), p. 280. (Tahuian) Upper Eocene.

Gemmula waihaoensis Finlay, 1924.

1917 *Turris regius* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 46, Pl. 12, f. 14. Non Bolten, 1798.
1924 *Gemmula waihaoensis* Finlay, Proc. Mal. Soc. 16, p. 103.

Holotype in Wanganui Public Museum.

Locality: McCullough's Bridge. (Tahuian) Upper Eocene.

Gemmula longwoodensis n. sp. Pl. 13, fig. 13.

Shell small, narrowly fusiform. Peripheral angle just below middle, bearing strong pointed tubercles, 15-16 per whorl. Spiral sculpture weak on spire whorls; a fine thread submargining suture, two very weak threads, close together on the otherwise smooth shoulder, and two crisp narrow cords between peripheral angle and lower suture. The body-whorl has three rather strong, but narrow, wide-spaced spirals above, followed by 11 weaker, wide-spaced spirals on the neck and canal. Protoconch sharply and narrowly conical of 6 whorls, the tip smooth, but the remaining whorls with regular, rather distant narrow axials. Sinus deep, on peripheral angle.

Height 10.7 mm.; diameter 4 mm. (Holotype.)

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. locs. 2563, 170 chains at 307° from Waihoka Corner; 2564 Marly mudstone, 75 chains at 295° from Waihoka Corner, Longwood, S.D. Orepuki, Southland. (Duntroonian) Upper Oligocene. (Holotype.)

Gemmula ornata (Marshall, 1918).

1918 *Turris ornatus* Marshall, Trans. N.Z. Inst. 50, p. 268, Pl. 18, figs. 8, 8a.

Holotype in Wanganui Public Museum.

Locality: Pakaurangi Point, Kaipara. (Hutchinsonian) Lower Miocene.

Gemmula kaiparaensis (Marshall, 1918).

1918 *Turris kaiparaensis* Marshall, Trans. N.Z. Inst. 50, p. 268, Pl. 18, figs. 9, 9a.

Holotype in Wanganui Public Museum.

Localities: Pakaurangi Point, Kaipara (type); N.Z.G.S. loc. 1272 Ihungia Series, Gisborne; road cutting 1 mile west of tunnel at north entrance to Awakino Gorge. (Hutchinsonian) Lower Miocene.

The Awakino examples have slightly smaller and more numerous gemmules, 21-22 per whorl compared with 17-20 in *kaiparaensis,* but other details so closely coincide that separation is scarcely warranted. However, two further members of the *kaiparaensis* group are here separated specifically, as they exhibit greater divergence. One has a triple spiralled keel instead of a bicarinate one, and the other has distinctive strong dense shoulder spirals, taller spire and very numerous tubercles.

Gemmula clifdenensis n. sp. Pl. 13, fig. 14.

Species closely resembling *kaiparaensis,* but the peripheral keel bears more numerous tubercles and is encircled by three narrow, sharply raised spiral cords, instead of being bicarinate. The tubercles are 17-20 per whorl in *kaiparaensis* and 22-24 in *clifden-*

ensis. The suture is submargined by a moderate smooth thread, the shoulder bears 5-7 weak threads, and below the keel on the body-whorl are three wide-spaced spiral cords followed by close-spaced threads on the neck.

Height, 18 mm.; diameter, 7 mm. (Holotype.)

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Clifden (6c) Southland. (Hutchinsonian) Lower Miocene.

Gemmula lawsi n. sp. Pl. 13, fig. 12.

Species related to *kaiparaensis,* but with far more numerous tubercles, on a bicarinate keel; having a taller spire and much stronger, more numerous spiral threads on the shoulder. Spire almost 1½ times height of aperture; bicarinate keel at lower third; peripheral tubercles fine, moniliform, 30 per whorl; subsutural border flat, distinct, finely spirally striated. Shoulder sculptured with 12 strong linear-spaced cords. Body-whorl with three wide-spaced, strong spirals above, followed by weaker wide-spaced cords with from 1-5 fine threads in the interspaces.

Height, 24.6 mm.; diameter, 8 mm. (Holotype.)

Holotype in collection of Dr. C. R. Laws, Auckland.

Locality: Pakaurangi Point, Kaipara. (Hutchinsonian) Lower Miocene.

Gemmula peraspera Marwick, 1931.

1931 *Gemmula peraspera* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 133, Pl. 15, f. 276.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Ormond Series, N.Z.G.S. loc. 1322 (type) and 1332, Gisborne. (?Urenuian) Upper Miocene.

Gemmula orba Marwick, 1931.

1931 *Gemmula orba* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 133, Pl. 15, f. 277.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Ormond Series, N.Z.G.S., loc. 1322 (type) Gisborne. (?Urenuian) Upper Miocene.

Gemmula disjuncta Laws, 1936.

1928 *Turris* cf. *duplex* Bartrum & Powell, Trans. N.Z. Inst. 59, p. 151.
1936 *Gemmula disjuncta* Laws, Trans. Roy. Soc. N.Z. 66, p. 120, Pl. 17, f. 82.

Holotype in Auckland Museum (Dr. C. R. Laws collection).

Locality: Kaawa Creek, S. of Port Waikato. (Opoitian) Lower Pliocene.

Genus **Echinoturris** n. gen.

Type: *"Turris" finlayi* Powell, 1935. (Awamoan) Middle Miocene, N.Z.

When the species *"Turris" finlayi* was described (Powell, 1935, Rec. Auck. Inst. Mus. 1 (pt. 6), p. 338) I noted that the generic location was provisional. While the species certainly belongs to the subfamily *Turrinae,* it cannot be conveniently placed in any of the known genera, and I do not know of another species quite like it. The blunt, round-topped, cylindrical-sided, smooth protoconch of two whorls, ending with a few closely spaced thin axials recalls that of *Gemmula* and *Eoturris,* but only in a general way, as in both of these the protoconch is conic, with more numerous whorls. The most distinctive features of *Echinoturris* are the bicarinate series of sparse prickly nodules, and the rather deep V-shaped sinus on the upper carina. True *Turris* has the sinus on a special rib immediately above the carina.

Echinoturris finlayi (Powell, 1935).

1935 *"Turris" finlayi* Powell. Rec., Auck. Inst. Mus. 1 (6), p. 338, Pl. 78, figs. 28, 29.

Holotype in Auckland Museum.

Localities: N.Z.G.S. loc. 1294, north bank Waihora River, N. of first ford, 4 m. E. from road turning off to Kanakanaia Settlement, Waingaromia S.D. (Ihungia series = Hutchinsonian) Lower Miocene.

Genus **Bathytoma** Harris & Burrows, 1891.

(Nom. nov. for *Dolichotoma* Bellardi, 1875, non Hope 1839.)

(Type (monotypy): *Pleurotoma cataphracta* Brocchi, Pliocene, North Italy.

New Zealand Hutchinsonian and Awamoan species are undoubtedly congeneric with the European Pliocene genotype, having an identical conical, pointed, polygyrate protoconch. The genus has been credited with a wide Tertiary to Recent range, but apart from European occurrences and the New Zealand species listed below, all others so far examined prove to have a blunt paucispiral protoconch as in the following genus *Micantapex*.

Key to N.Z. Species of Bathytoma.

Periphery finely gemmulate, 29-36 on penultimate.
  Basal spirals finely gemmulate.
    Keel from one third whorl height to just below middle .... *haasti* (Hutton)
    Keel at lower suture .... **mitchelsoni* Powell
Periphery with strong prickly nodules, 14-22 on penultimate.
  Keel with 14 distant nodules on penultimate.
    Basal spirals granulated .... **bartrumi* Laws
  Keel with 22 nodules on penultimate.
    Basal spirals nodulated, wide spaced, few .... **finlayi* Laws

Bathytoma haasti (Hutton, 1877).

1887 *Clavatula haasti* Hutton. Trans. N.Z. Inst. 9, p. 595, Pl. 16, f. 5.
1915 *Bathytoma haasti* Suter. N.Z. Geol. Surv. Pal. Bull. 3, p. 37.

Holotype in Otago University Museum, Dunedin.

Localities: Mt. Harris (type), White Rock River; Sutherlands; Blue Cliffs, S. Canterbury. (Awamoan) Middle Miocene.

Odd specimens from the following three localities may require separation later; the shoulder spirals are weaker and the basal cords mostly have only one interstitial thread, but on the other hand occasional topotypes show these same tendencies.

c.f. *haasti*.

Localities: N.Z.G.S. loc. 1042 Argillaceous sandstone, Waikaka Rd., 2½ miles N. from junction of Whenuokura Rd., Aria S.D. Tangarakau Mahoenui beds (Hutchinsonian) Lower Miocene; N.Z.G.S. loc. 2172 Mohakatino Valley, opposite end of Purapura Track, Mokau; N.Z.G.S. loc. 2933 Track, north bank, Mokau River, at the big bend 3 m. E. of Mokau Township, ¾ m. S.S.W. of Pukewhero Trig, Awakino N. S.D. (Mokau = Awamoan ?) Middle Miocene.

Bathytoma mitchelsoni Powell, 1935.

1935 *Bathytoma mitchelsoni* Powell. Rec., Auck. Inst. Mus. 1, p. 337, Pl. 77, figs. 15, 16.

Holotype in Auckland Museum.

Locality: Motutara, tuffs. (Awamoan) Middle Miocene.

Bathytoma bartrumi Laws, 1939.

1939 *Bathytoma bartrumi* Laws. Trans. Roy. Soc. N.Z. 68, p. 496, Pl. 63, f. 25.

Holotype in collection of Dr. C. R. Laws, Auckland.

Locality: Pakaurangi Point. (Hutchinsonian) Lower Miocene.

Bathytoma finlayi Laws, 1939.

1939 *Bathytoma finlayi* 1939. Trans. Roy. Soc. N.Z. 68, p. 497, Pl. 63, f. 23.

Holotype in collection of Dr. C. R. Laws, Auckland.

Locality: Clifden (bed C. left side of Waiau River) Southland. (Hutchinsonian) Lower Miocene.

Genus **Micantapex** Iredale, 1936.

Type (o.d.): *Bathytoma agnata* Hedley & Petterd, 1906. Recent, 250 fath. off Sydney, N.S.W.

As already stated (Powell, 1940, p. 244) I have advocated the use of *Micantapex* for the Austro-Neozelanic Recent-Tertiary *Bathytoma*-like shells, which differ from true *Bathytoma* in having a blunt, smooth paucispiral apex. Similar shells, however, have a wide distribution in deep water, occurring in the Indian Ocean, Japan and the West Indies. More than likely further separation of the *Bathytoma*-like shells will be found necessary but for the present only the Austro-Neozelanic members are considered. True *Bathytoma*, with its conical, pointed, polygyrate, protoconch certainly occurs in New Zealand Hutchinsonian to Awamoan horizons, but so far no true *Bathytoma* has been located in the Australian region, either Recent or fossil. The New Zealand series, congeneric with the local so-called *Bathytoma murdochi* Finlay, 1930 (= Pl. *(Hemipleurotoma) nodilirata* (Murdoch & Suter) has its nearest Australian Tertiary relative in the (Kalimnan) Lower Pliocene *Genotia pritchardi* Tate, 1894. Congeneric with this Kalimnan species are the Australian Tertiary *Pleurotoma rhomboidalis* Ten.-Woods, 1880 (Balcombian), *Genotia decomposita* Tate, 1894 (Janjukian) and *Genotia fontinalis* Tate, 1894 (Janjukian). The generic name *Micantapex*, provided for the Recent *Bathytoma agnata* Hedley & Pritchard, from 250 fathoms off Sydney, New South Wales, a species known to me only from the original figure (which is in profile), appears to be an available name for this *Bathytoma*-like series.

The Australian Tertiary (Kalimnan) *Pleurotoma sayceana* Chapman, 1912, although considered by its author to be close to *tuberculata* Kirk (= *murdochi* Finlay) really belongs to a distinct unnamed group which occupies a mid position between *Micantapex* and *Epidirona*. This matter will receive attention in the section on the Australian *Turridae*, which awaits publication.

Neither the radula nor the operculum of any of the Austro-Neozelanic species ascribed to *Micantapex* is known, but the apparently related West Indian abyssal *Genota viabrunnea* Dall, 1889, is described as having an operculum that is "thin, horny, elongated and pointed at the anterior end, which is the nucleus." *Pleurotoma (Genota) engonia* Watson, 1881, from 345 fath. off Japan, and *Genota atractoides* Watson, 1881, from 375 fathoms off the Philippines, also belong to *Micantapex* as herein interpreted.

The Parisian Eocene genus *Epalxis* Cossmann, 1889, bears considerable resemblance to the narrow forms of *Micantapex*, having a similar apex, sinus and canal, but the sculpture is suggestive of a different group.

In New Zealand the range of *Micantapex* is (Hutchinsonian) Lower Miocene to Recent.

Key to N.Z. Species of Micantapex.

1. Shell moderately to broadly biconic. Periphery strongly angled.
   - Peripheral keel as double row of beaded cords.
     - Subsutural border prominent.
       - Keel just below middle .... **pergracilis* (Marwick)
   - Peripheral nodules very numerous (30 per whorl) .... **tenuinctus* (Marwick)
       - Keel near lower suture .... **medius* (Marwick)
   - Peripheral keel formed of 4-5 beaded cords.
     - Subsutural border absent .... **filaris* (Marwick)

Peripheral keel of one strong beaded cord, margined above and below by weaker cords.
Subsutural border distinct .... **praecisus* (Marwick)
Peripheral keel crossed by 3 strong spirals.
Subsutural border of 2 moniliform cords .... **ngatapa* (Marwick)

1a. First cord immediately below keel always weak.
Peripheral keel divided by 3 spiral grooves.
Subsutural border strong.
Keel broad, massive, low down near suture.
Nodules 15-17 per whorl. About 10 main spirals on body-whorl; those on neck with intermediates .... **fortinodosus* (Marwick)
Peripheral keel bearing 3-4 spiral threads.
Subsutural border distinct.
Keel broad, low down, adjoining suture.
Nodules 13-16 per whorl. About 10 main spirals on body-whorl; without intermediates .... *finlayi* Powell
Nodules 16-17 per whorl. About 12 main spirals on body-whorl; lower half with intermediates .... **proavitus* n. sp.
Keel broad, below middle, but with emergent cords beneath, on spire-whorls.
Nodules 15-17 per whorl. From 6-7 main spirals on body-whorl; without intermediates .... **paucispiralis* n. sp.
Nodules 20-22 per whorl. About 16 main spirals with some intermediates **murdochi* (Finlay)

2. Shell narrowly fusiform.
Periphery strongly angled, bearing 3-4 spiral threads.
Subsutural border a moderately broad beaded fold.
Base with 3 wide-spaced strong upper spirals followed by 10 closer spaced threads *angustatus* Powell
Base with 8 wide-spaced strong cords followed by 6 closely spaced threads ..**hawera* (Laws)

3. Shell broadly fusiform, inflated.
Peripheral keel weakly angled; double row of nodules.
Subsutural border of 1-2 beaded cords on broad band.
Spiral sculpture dominant. Peripheral nodules 30 per whorl; obsolete over lower whorls .... **discors* n. sp.

Micantapex pergracilis (Marwick, 1931).

1931 *Epidcira pergracilis* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 134, Pl. 15, f. 278.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. locs. 1272, 1293 (type), 1342 ? Ihungia Series, Gisborne. (Hutchinsonian) Lower Miocene.

Micantapex praecisus (Marwick, 1931).

1931 *Epidcira praecisa* Marwick. N.Z. Geol. Survey. Pal. Bull. 13, p. 134, Pl. 15, f. 282.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. locs. 1293 (type), 1342, Ihungia Series. (Hutchinsonian) Lower Miocene; 1243, Tutamoe Series, Gisborne. (Awamoan) Middle Miocene.

Micantapex medius (Marwick, 1931).

1931 *Epidcira media* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 135, Pl. 15, f. 283.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. locs. 1295, 1328 (type), Ihungia Series. (Hutchinsonian) Lower Miocene; 1275, 1646, Tutamoe Series, Gisborne. (Awamoan) Middle Miocene.

Micantapex ngatapa (Marwick, 1931).

1931 *Epidcira ngatapa* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 135, Pl. 15, f. 280.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. locs. 1272, 1340 (type), 1342, 1358 Ihungia Series. (Hutchinsonian) Lower Miocene; 1251, 1360, 1615a, 1626, Tutamoe Series, Gisborne. (Awamoan) Middle Miocene; N.Z.G.S. loc. 1133 coast from Mimi Stream north for 1 mile, Waitara S.D., Taranaki. (Urenuian) Upper Miocene.

Micantapex filaris (Marwick, 1931).

1931 *Epideira filaris* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 134, Pl. 15, f. 279.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z.G.S. loc. 1243, Tutamoe Series, Gisborne. (Awamoan) Middle Miocene.

Micantapex tenuinetus (Marwick, 1931).

1931 *Epideira tenuincta* Marwick. N.Z. Geol Surv. Pal. Bull. 13, p. 136, f. 285.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. locs. 1322, 1332 (type), Ormond Series, Gisborne. (Urenuian), Upper Miocene; 1543 Mangawhero Creek, Taramarama (S.W.) S.D. (Opoitian) Lower Pliocene.

Micantapex discors n. sp. Pl. 13, fig. 5.

Species readily distinguished by its inflated whorls, blunt, not very prominent median peripheral angle, shallowly concave shoulder and tendency for the spiral sculpture to dominate the axial. Whorls about 8 (apex missing). Spire less than height of aperture. About 30 close-spaced small blunt nodules as a double row forming the peripheral keel. (These are very indistinct both in the holotype and in the Mapiri specimen, being confined to the early whorls, but in two fragmentary paratypes the nodules persist strongly down to the body-whorl.) Suture submargined by a broad band crossed by one or two cords which are rendered regularly nodulose by oblique lines of growth; shoulder bearing one or two subobsolete spirals; double strong cords forming peripheral angle, and 2-4 weaker cords between it and the lower suture. The body-whorl has 24 moderately strong linear-spaced smooth cords and a few obscure ones on the fasciole.

Height, 25.1 mm.; diameter, 10.5 mm. (Holotype.)

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. loc. 1515, beds below pumiceous sandstone, Mapiri North Beach, Paritu S.D., near base of Mapiri beds (Taranakian) Upper Miocene; N.Z.G.S. loc. 706 Clyde, Wairoa River, Hawke's Bay (Waitotaran) Lower Pliocene. (Holotype.)

Further material may show that two species are represented. However, the typical form with subobsolete axials occurs in both the Taranakian and the Waitotaran.

Micantapex fortinodosus (Marwick, 1931.)

1931 *Epideira fortinodosa* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 135, Pl. 15, f. 284.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. locs. 1325 (type), (Opoitian) Lower Pliocene. 1332, Ormond Series, Gisborne (Urenuian) Upper Miocene.

This species is directly ancestral to *paucispiralis* n. s.p.

Micantapex proavitus n. sp. Pl. 13, fig. 4.

Species directly ancestral to the finely sculptured typical form of *murdochi,* differing in having a shorter spire and a broader peripheral keel, which is low-set on the spire whorls, leaving scarcely any space for spirals between it and the lower suture. Shell solid, broadly fusiform. Spire less than height of aperture. Whorls 7, including typical protoconch. Peripheral carina wide, massive, rounded and prominently projecting, situated low down close to lower suture and bearing 16-17 bluntly rounded nodules, crossed by four distinct spiral threads. Subsutural border narrow, rendered weakly nodulous by axial growth lines. Body-whorl with about 12 narrow, sharply raised, smooth spiral

cords, wide spaced above, but closer and with intermediates over the lower half of the base, and about 8 fine, closely spaced threads on the fasciole. The broad shoulder is crossed by subobsolete spiral lirations.

Height, 18.75 mm.; diameter, 9 mm. (Holotype.)

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. loc. 2314, near Rangitoto Junction, 2½ miles at 355° from Trig. 22, Motuotaraia (N.W.) S.D., Dannevirke (Holotype); N.Z.G.S. loc. 2317, grey sandstone below Te Aute limestone, 66 chains at 310° from Trig. N., Takapau (N.E.) S.D., Dannevirke. (Waitotaran) Lower Pliocene.

A single fragmentary specimen from the latter locality has stronger spiral lirations on the shoulder and evidence of a taller spire, but is otherwise typical.

Micantapex hawera (Laws, 1940).

1940 *Bathytoma hawera* Laws. Trans. Roy. Soc. N.Z. 70, p. 56, Pl. 7, f. 23.

Holotype in collection of Dr. C. R. Laws, Auckland.

Locality: Hawera. (Waitotaran) Lower Pliocene.

Micantapex paucispiralis n. sp. Pl. 13, fig. 2.

Shell solid, broadly fusiform. Whorls 7½, including typical protoconch. Spire whorls with a massive rounded median carina and a strong subsutural border. Peripheral carina bearing 15-17 strong rounded nodules crossed by four very weak and indistinct spiral threads. Subsutural border rendered nodulous where crossed by axial growth lines. Spiral sculpture strong, consisting of 1-2 smooth cords between the peripheral carina and the lower suture, and a further 4-5 on the base, making 6-7 on the body-whorl from the carina to the fasciole. There are no interstitial spirals, but the fasciole bears 5-6 distinct close-spaced threads. Spire about same height as aperture.

Height, 20.4 mm.; diameter, 8 mm. (Holotype.)

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z.G.S. loc. 2612, mudstone, east bank Makara Stream, 30-35 chains upstream from Ruakakapatuna Junction (Holotype); N.Z.G.S. loc. 2610, Makara Stream, about 50 chains up from Ruakakapatuna Junction, outcrop forming W. side of stream, Waipawa S.D., Wairarapa (Lower Nukumaruan); yellowish sandstone, Roto Kuri Id., Inner Harbour, Napier (Upper Nukumaruan) Middle Pliocene.

Micantapex murdochi (Finlay, 1930). Pl. 13, fig. 1.

1882 *Pleurotoma tuberculata* Kirk. Trans. N.Z. Inst. 14, p. 409. Non Gray.

1893 *Pleurotoma tuberculata* : Hutton. Macleay Mem. Vol. Plioc. Moll. p. 50, Pl. 6, f. 29.

1906 *Pleurotoma (Hemipleurotoma) nodilirata* Murdoch & Suter. Trans. N.Z. Inst. 38, p. 284. Nom. nov. for *P. tuberculata* Kirk, non Gray.

1930 *Bathytoma murdochi* Finlay. Trans. N.Z. Inst. 61, p. 46. Nom. nov. for *Pl. (H.) nodilirata* Murd. & Sut., non Smith, 1878.

Lectotype and 7 syntypes in N.Z. Geological Survey Office, Wellington.

Owing to great variation in the spiral element of the sculpture in the Nukumaruan *murdochi,* exact limits are difficult to fix. Species of the group range from the Opoitian *fortinodosa* to the Recent deep-water *finlayi.* The main line of development is represented by species having few, strong, wide-spaced spiral cords on the base, without intermediate threads: the Opoitian *fortinodosa*—the Lower and Upper Nukumaruan *paucispiralis* and the Recent *finlayi.* Parallel with this series is a group in which the basal spirals are weaker, more numerous and with intermediate threads. This is the group of *murdochi* typical, commencing with the Waitotaran *proavitus* and reaching the Upper Nukumaruan in *murdochi.*

In Lower Nukumaruan localities the two forms, *paucispiralis* and *murdochi,* seem quite distinct, but in the Upper Nukumaruan there is a tendency to intergrade, although almost invariably *murdochi* is from the blue clays and *paucispiralis* the yellowish sandstones. These forms may yet be found to have ecological or bathymetric significance; meanwhile the two extremes are separated specifically.

Again, parallel to both of the above mentioned groups is a narrowly fusiform series represented by the Waitotaran *hawera* and the Nukumaruan-Recent *angustatus.*

Localities: N.Z.G.S. loc. 2656, sandy mudstone, 80 chains at 243° from Trig. 54, Tahoraite (N.W.) S.D.; N.Z.G.S. loc. 2687, road bend, 108 chains at 35° from Trig. 55, Tahoraite (S.W.) S.D., Dannevirke (Lower Nukumaruan); N.Z.G.S. loc. 2330, blue grey sands above Te Aute limestone, 171 chains at 340° from Trig. P. 1, Takapau, Tahoraite (N.E.) S.D.; Petane (type); Caron Creek; Devil's Elbow, Napier-Wairoa Road; middle of Newton Range (upper marl), Tutira, Hawke's Bay (Upper Nukumaruan) Middle Pliocene.

Micantapex angustatus Powell, 1940.

1906 *Pleurotoma (Hemipleurotoma) nodilirata* Murdoch & Suter. Trans. N.Z. Inst. 38 (Pl. 22, f. 11, only; Castlecliff).

1940 *Micantapex angustatus* Powell. Trans. Roy. Soc. N.Z. 70, p. 245, Pl. 31, f. 7.

Holotype in Auckland Museum.

Localities: Nukumaru; cliff opposite Eskdale Bridge, Petane (Nukumaruan) Middle Pliocene; Castlecliff, Wanganui (Castlecliffian) Upper Pliocene; 26 fath. off Waikuku Beach, North Cape (Holotype); 23 fath. off Ahipara; 110 fath. off Great Barrier Island.

Micantapex finlayi Powell, 1940. Pl. 13, fig. 3.

1906 *Pleurotoma (Hemipleurotoma) nodilirata* Murdoch & Suter. Trans. N.Z. Inst. 38, p. 284 (in part).

1940 *Micantapex finlayi* Powell. Trans. Roy. Soc. N.Z. 70, p. 245.

Holotype in writer's collection, Auckland Museum.

Locality: Recent, 110 fathoms off Great Barrier Island.

The species is distinguished from *murdochi* by having fewer peripheral nodules, only 13-16 per whorl, and narrower basal spirals, the upper ones being much wider spaced.

Micantapex sp.

1881 *Pleurotoma (Genota) engonia* Watson. Journ. Linn. Soc. Lond. 15, p. 405 (but not the type).

Suter (1913, p. 492) included this species in the New Zealand fauna as *Bathytoma engonia,* following Watson, 1886, who cited for it two localities:—

(?) Station 169. 700 fath. N.E. from New Zealand, and
Station 232. 345 fath. off Inosima, Japan.

Suter by first citing the New Zealand station and then adding "Also off Inosima," etc., gave the impression that the former station was the type locality, but this was not intended by Watson, for he prefixed the New Zealand station with a query, and then remarked of the specimen: "It is very much rubbed—". Moreover, his figure is that of a perfectly preserved shell, which leaves no doubt that Japan is the type locality.

Since there is little likelihood of specific identity between Turrids with the paucispiral style of apex, from such widely separated localities, the New Zealand shell, which has not since been met with, is best regarded as an unnamed *Micantapex.*

Genus **Fenestrosyrinx** Finlay, 1926.

Type (o.d.): *Turris nexilis bicarinatus* Suter. (Castlecliffian) Upper Pliocene, N.Z.

A group of miniature, openly fenestrate sculptured *Bathytoma*-like shells, but with a much shallower sinus, the apex of which is on the peripheral keel. Sinus angles of ap-

proach unequal, being steep and straight above, but protractively arcuate below. Protoconch paucispiral, of barely two whorls, papillate, slightly globose, apparently smooth, but under high magnification there is a dense pattern of minute spiral striations and punctures. Pillar suddenly and sharply obliquely truncated by the inflection of a short open canal. The genus is of Upper Pliocene to Recent occurrence in New Zealand, and is represented in the Australian Recent fauna by *Hemipleurotoma mayi* Verco, 1909, *Daphnella vestalis* Hedley, 1903, and *Daphnella granata* Hedley 1922.

Key to Species of Fenestrosyrinx.

Shell squat and wide. Spire lower than aperture.
  Body-whorl with 6 main spirals .... *gratiosa* (Suter)
Shell more elate. Spire generally higher than aperture.
  Body-whorl with 5 main spirals.
    Peripheral spiral very prominent, forming a sharp jutting keel on all whorls.. **nexilis* (Hutton)
    Peripheral spiral not prominent, two equal keels on spire whorls. Body-whorl bluntly keeled .... *nexilis bicarinata* (Suter)

Fenestrosyrinx gratiosa (Suter, 1908).

1908 *Bathytoma gratiosa* Suter. Proc. Malac. Soc. 8, p. 186, Pl. 7, f. 19.
1913 *Bathytoma gratiosa* : Suter. Man. N.Z. Moll., p. 493.

Holotype in Wanganui Public Museum.
Localities: 18 fath. Port Pegasus, Stewart Island (type); Dusky Sound (dredged).

Fenestrosyrinx nexilis (Hutton, 1885).

1885 *Clathurella ? nexilis* Hutton. Trans. N.Z. Inst. 17, p. 317, Pl. 18, f. 9. (Holotype and 2 paratypes separated from Hutton's syntypes by Suter 1915, N.Z. Geol. Surv. Pal. Bull. 3, p. 34.)

Holotype in Canterbury Museum, Christchurch.
Locality: "Wanganui (Pliocene)" (type); Castlecliff, Wanganui (Castlecliffian) Upper Pliocene.

Fenestrosyrinx nexilis bicarinata (Suter, 1915).

1885 *Clathurella ? nexilis* Hutton (partim). Trans. N.Z. Inst. 17, p. 317. (Five of Hutton's syntypes of *nexilis* separated by Suter 1915, N.Z. Geol. Surv. Pal. Bull. 3, p. 34.)
1915 *Turris (Hemipleurotoma) nexilis bicarinatus* : Suter. N.Z. Geol. Surv. Pal. Bull. 3, p. 34.
1919 *Leucosyrinx thomsoni* Mestayer, 1919. Trans. N.Z. Inst. 51, p. 133, Pl. 8, f. 5.

Holotype in Canterbury Museum, Christchurch.
Localities: "Wanganui (Pliocene)" type of *bicarinatus* (Castlecliffian) Upper Pliocene; off Hen and Chickens Islands in 25-26 fathoms (type of *thomsoni*).

TURRICULINAE.

Genus **Comitas** Finlay, 1926.

Type (o.d.) : *Surcula oamarutica* Suter (= *Drillia fusiformis* Hutton). (Awamoan) Middle Miocene, N.Z.

This is typically a Mid-Tertiary group, represented in both Australia and New Zealand, but reaching Recent times only in New Zealand with *C. trailli* (Hutton). In shape and sinus the genus resembles the tropical *Turricula* (= *Surcula* auct.), but *Comitas* has a two-whorled, papillate, smooth protoconch, which although not large, is of much greater size than the minute three-whorled apex of *Turricula*, as seen in *javana* Linn., a near relative of *flammea* Schumacher, the genotype. The apex of the protoconch in both *Turricula* and *Comitas* is asymmetrical, but that of the former is planorbid, and that of the latter paucispiral. Also in *Comitas*, the axials are longer, more *Fusus*-like, and the suture is only weakly submargined. *Fusiturricula* Woodring, 1928 (p. 165), type, *Turris (Surcula) fusinella* Dall, Recent, Gulf of Panama, may be congeneric with *Comitas*, but I lack material to make the comparison. Grant and Gale 1931 (p. 489) unite *Tropisurcula* Casey, 1904 and

Fusiturricula under *Pleurofusia* de Gregorio, 1890, but these authors, influenced by Dall's later papers on the *Turridae*, have practically ignored nuclear characters throughout, and in other instances in their work have thus synonymised widely sundered groups. Two Australian Tertiary members are *Pleurotoma wynyardensis* Pritchard (Janjukian) and *Pleurotoma salebrosa* Harris (Balcombian).

Key to Species of Comitas.

A. Shell narrowly fusiform.

1. Axials rounded, rather long, fold-like, extending from just above shoulder angle to or slightly below lower suture.
   - Shoulder at about two-thirds whorl height.
     - Spiral sculpture dense, with wider spaced stronger threads.
       - Axials 7 per whorl, broadly rounded, vertical .... **latiaxialis* (Marshall)
     - Spiral sculpture of strong rounded cords.
       - Axials 11 per whorl, broadly rounded, vertical .... *trailli* (Hutton)
     - Spiral sculpture of numerous weak cords and intermediate threads.
       - Axials 12-13 per whorl, narrowly rounded, oblique .... **onokeana* King
   - Shoulder just above middle of whorl height.
     - Axials 10-12 per whorl, broadly rounded, slightly oblique.
       - Spirals moderate, with intermediate threads (height 30-60 mm.) ....**fusiformis* (Hutton)
       - Spirals strong, sharply raised (height 25 mm.) .... **kaipara* Laws
   - Shoulder at about one third whorl height.
     - Axials about 12 per whorl, very oblique .... **imperfecta* King
2. Axials narrow, obliquely flexuous.
   - Shoulder above middle ....**solitaria* (King)
3. Axials weak, confined to periphery.
   - Spiral sculpture of strong crisp cords.
     - Axials 13 per whorl .... **allani* n. sp.
4. Axials as blunt rounded knobs occupying one third whorl height.
   - Base with regular spiral threads.
     - Axials 9-10 per whorl. Shell height 25 mm. .... **abnormis* King
     - Axials 11-12 per whorl. Shell height 19 mm. .... **declivis* Powell
   - Base with two prominent cords as well as weak spirals.
     - Axials 12-13 per whorl; longer than wide on body-whorl .... **bilix* Marwick

B. Shell broadly fusiform.

Axials very blunt and broadly rounded, not prominent, restricted to a massive rounded peripheral bulge. Shoulder deeply concave, almost channelled .... **latescens* (Hutton)

Comitas latiaxialis (Marshall, 1918).

1918 *Surcula latiaxialis* Marshall. Trans. N.Z. Inst. 50, p. 267, Pl. 20, f. 3.

Holotype in Wanganui Public Museum.
Locality: Pakaurangi Point, Kaipara. (Hutchinsonian) Lower Miocene.

Comitas kaipara Laws, 1939.

1939 *Comitas kaipara* Laws. Trans. Roy. Soc. N.Z. 68, p. 497, Pl. 65, f. 44.

Holotype in collection of Dr. C. R. Laws, Auckland.
Locality: Pakaurangi Point, Kaipara. (Hutchinsonian) Lower Miocene.

Comitas latescens (Hutton, 1873). Pl. 13, fig. 7.

1873 *Pleurotoma latescens* Hutton. Cat. Tert. Moll., p. 4.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Mount Brown, North Canterbury. (Hutchinsonian) Lower Miocene.

Comitas fusiformis (Hutton, 1877).

1873 *Pleurotoma trailli* Hutton. Cat. Tert. Moll., p. 4 (June), non Cat. Mar. Moll., p. 11 (May). Awamoa.

1877 *Drillia fusiformis* Hutton. Trans. N.Z. Inst. 9, p. 595, non *Pleurotoma fusiformis* Sowerby 1823 (not homonyms).

1914 *Surcula huttoni* Suter. N.Z. Geol. Surv. Pal. Bull. 2, p. 28, nom. nov. for *Pleurotoma trailli* Hutton, 1873 (June), non (May), Awamoa.
1917 *Surcula oamarutica* Suter. N.Z. Geol. Surv. Pal. Bull. 5, p. 51, Pl. 6, figs. 9, 10.
1924 *Turricula oamarutica* : Finlay. Proc. Mal. Soc. 16, p. 104.
1926 *Comitas oamarutica* : Finlay. Trans. N.Z. Inst. 56, p. 251.

Holotype in Otago University Museum, Dunedin.
Localities: Mt. Harris, S. Canterbury (type of *fusiformis*); "Oamaru" (type of *oamarutica*. Most likely from Rifle Butts, by colour and preservation of specimens); Awamoa, near Oamaru (type of *trailli* Hutton 1873 (June)); Dyer's Run; and Sutherland's, South Canterbury; Pukeuri and Target Gully, near Oamaru. (Awamoan) Middle Miocene.

Comitas abnormis King, 1933.

1933 *Comitas abnormis* King. Trans. N.Z. Inst. 63, p. 348, Pl. 37, f. 17.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Mouth of Putangirua Creek, Palliser Bay, Hurupi Series. (Tongaporutuan) Upper Miocene.

Comitas imperfecta King, 1933.

1933 *Comitas imperfecta* King. Trans. N.Z. Inst. 63, p. 349, Pl. 35, f. 2.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Marls 1 m. below Turanganui Gorge, S. Wairarapa, Hurupi Series. (Tongaporutuan) Upper Miocene.

Comitas bilix Marwick, 1931.

1931 *Comitas bilix* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 137, Pl. 15, f. 286.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Ormond Series, loc. 1290, Gisborne. (Opoitian) Lower Pliocene.

Comitas declivis Powell, 1931.

1931 *Comitas declivis* Powell. Rec. Auck. Inst. Mus. 1, p. 107, Pl. 14, f. 41.

Holotype in Auckland Museum.
Locality: Waihi Beach, Hawera. (Waitotaran) Lower Pliocene.

Comitas onokeana King, 1933.

1933 *Comitas onokeana* King. Trans. N.Z. Inst. 63, p. 348, Pl. 37, f. 16.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Cliffs E. of Lake Ferry, Palliser Bay. (Nukumaruan) Middle Pliocene.

Comitas allani n. sp. Pl. 10, fig. 6.

Shell of moderate size, fusiform, with spire slightly taller than aperture plus canal. Whorls 8, including typical two-whorled protoconch. The species resembles *imperfecta* King, 1933, but has stronger spiral sculpture and the axials still further reduced and not so oblique. The shoulder is only lightly concave and the angulation is just about half the whorl height. Axials broadly-rounded, but very weak, not reaching lower suture and barely encroaching on the smooth shoulder; they number 13 on the pentultimate. Spiral cords strong, flat-topped, four primaries and some intermediates on spire-whorls and about 18 on base and neck. Sinus and aperture typical.
Height, 26.75 mm.; diameter, 10 mm. (Holotype.)

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: N.Z.G.S. loc. 1543 mudstone and argillaceous sandstone beds, Mangawhero Stream, Taramarama (S.W.) S.D., Wairoa (Opoitian) Lower Pliocene; Devil's Elbow, Napier-Wairoa Road (Nukumaruan) Middle Pliocene (Holotype; collected by Dr. R. S. Allan).

? Comitas solitaria (King, 1933).

1933 *Insolentia solitaria* King. Trans. N.Z. Inst. 63, p. 350, Pl. 36, f. 11.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Cliffs east of Lake Ferry, Palliser Bay (Nukumaruan) Middle Pliocene.

This species is based upon a single specimen, having the apex somewhat worn and the body-whorl half broken away. It was referred by its author tentatively to *Insolentia*, but there is no possible relationship, for the protoconchs are totally dissimilar, that of *solitaria* being blunt and smooth, of $1\frac{1}{4}$ whorls, followed by a half whorl of strong brephic axials, and that of *Insolentia* tall, polygyrate, sharply conic, of three smooth whorls, followed by a wider whorl with distant arcuate riblets. Probably *solitaria* represents a new genus related to *Comitas*, for that genus has a blunt paucispiral nucleus somewhat similar to that of *solitaria*, but with the initial whorl more bulbous and lacking the nuclear brephic axials.

As a second provisional location, pending the finding of better material, *solitaria* is placed in *Comitas* without prejudice.

Comitas trailli (Hutton, 1873).

1873 *Pleurotoma trailli* Hutton. Cat. Mar. Moll., p. 11 (May).
1899 *Surcula verrucosa* Suter. Trans. N.Z. Inst. 31, p. 70.
1915 *Drillia trailli* : Suter. Man. N.Z. Moll. Atlas of Plates, Pl. 46, f. 24.

Holotype in Dominion Museum, Wellington.
Localities: 24 fathoms, Stewart Island (type of *trailli*); 15 fathoms, Foveaux Strait (type of *verrucosa*); 60 fathoms, Otago Heads.

Subgenus **Carinacomitas** n. subgenus.

Type: *Pleurotoma clarae* Tenison-Woods, 1880 (non Hoernes and Auinger, 1891). (Balcombian) Middle Miocene, Victoria.

I have noted below under the description of *Comitas subcarinapex* n. sp. the atypical protoconch of that species and the Australian Tertiary *Pleurotoma clarae* Tenison-Woods. In both species, the initial whorl is not so bulbous, and towards its close there develops a carina, situated low down, and preceding the stronger angulation of the brephic stage. Actually this is a relatively slight variation from the typical protoconch, occasioned by an earlier inception of the keel. It is of interest, however, that middle Tertiary species in both New Zealand and Australia exhibit this feature, yet true *Comitas* is represented by contemporary species in both countries also. A bigger departure from the true *Comitas* apex is exhibited by the new Recent species described, following, in which the whole apex has become greatly depressed, and the angulation occasioned by the carina is much more acute.

Both of these groups show a further difference from typical *Comitas* in the sinus, which is broader and shallower; that of *Comitas* being restricted from above by a weak but rather broad subsutural band. There is a further difference between the two aberrants in respect to the anterior canal, which is long in the *clarae* group and quite short in the New Zealand Recent new species.

The *clarae* group may be distinguished subgenerically as *Carinacomitas* n. subgenus, type *Pleurotoma clarae* Tenison-Woods, and the New Zealand Recent species as *Anticomitas* n. gen. type *A. vivens* n. sp.

Comitas (Carinacomitas) subcarinapex n. sp. Pl. 10, fig. 5.

Shell rather small, fusiform, with spire about same height as aperture plus canal (end of canal missing in holotype). Post-nuclear whorls sculptured with broadly rounded,

strong axials fading out above on shoulder, nine on penultimate, and crossed by two strong but narrow and close-spaced spiral cords, uppermost forming the angle. On the base a third cord proceeds from the lower suture, and a fourth occurs below it; all four being equispaced. The whole shell is otherwise smooth and polished, apart from about eight very fine and indistinct spiral threads on the neck of the anterior canal. The deeply concave shoulder occupies more than half the height of each whorl, and is smooth except for the broad but deeply arcuate growth lines representing the sinus. The suture is weakly and narrowly submargined by a slight fold. Whorls 7½, including a smooth paucispiral protoconch of two whorls, which differs slightly from that of the genotype in having the initial whorl less bulbous, and towards its close the development of a sharp carina, situated low down, and preceding the angulation, represented in the brephic stage of the typical species.

Height (estimated), 10.5 mm.; diameter (estimated), 4 mm.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Clifden (6c Type, and 6a), Southland. (Hutchinsonian) Lower Miocene.

Genus **Anticomitas** n. gen.

Type: *A. vivens* n. sp. (Recent) N.Z.

The diagnosis of the genus precedes this under the subgenus *Carinacomitas.* The genus is founded for the reception of a New Zealand Recent species allied to *Comitas* but having a very depressed carinate apex, a broad, rather shallow sinus and a relatively short anterior canal.

Anticomitas vivens n. sp. Pl. 10, fig. 11.

Shell of moderate size, robust, fusiform, sculptured with heavy blunt axials and moderately strong spiral cords. Spire 1 1/3 times height of aperture, plus canal. Whorls 7½, including a vertically compressed, smooth protoconch of 2½ whorls, first whorl low and rounded, with a slight angulation just above the suture; this develops into a sharp carina at the lower fourth on the remaining 1½ whorls, and then curves upward to a central position over a short brephic stage, with blunt, rather distant axials. Shoulder on post-nuclear whorls concave and occupying the upper third. Axials very strong and bluntly rounded from shoulder angle to lower suture, but rapidly diminishing over shoulder and base, just reaching the neck, 9 on body whorl. Two main spiral cords on early spire-whorls, then increasing to three, with a further three or four on the base, and having a weaker cord in each interspace. About fifteen weaker cords on neck, lower six more closely spaced. Aperture subquadrate, with a rather short anterior canal having a very shallowly notched oblique termination. Sinus broad and shallow occupying the shoulder, and not restricted by any sutural band, or margining. Colour uniform buff.

Height, 9.5 mm.; diameter, 4.1 mm. (Holotype).

Holotype in writer's collection (Auckland Museum).
Locality: 140 fathoms off Three Kings Islands.

Genus **Paracomitas** n. gen.

Type: *Surcula castlecliffensis* Marshall & Murdoch, 1919. (Castlecliffian) Upper Pliocene, N.Z.

A puzzling group, which has a carinate-protoconch strikingly similar to that of *Aoteadrillia,* but on the evidence of the sinus, long canal, and forwardly inclined outer lip, the genus actually belongs to a different subfamily, the *Turriculinae.* It is probably nearest related to *Comitas,* in several species of which the protoconch shows a tendency towards carination. From *Comitas,* the new genus differs in the initial whorl of the protoconch being depressed dome-shaped, strongly carinate, not bulbous, and in the very broad, rather shallow sinus, distinctive sculpture of flat-topped spiral cords, beaded at the angle

by numerous weak oblique axials, and typically with a second angulation on the body whorl, proceeding from the suture, and defined by a heavier smooth spiral cord. *Pleurotoma gemmea* Murdoch, *Surcula protransenna* Marshall and Murdoch, and *Turris augusta* Murdoch and Suter undoubtedly belong here, while *Pleurotoma (Drillia) gypsata* Watson agrees in respect to protoconch and general facies, except for the absence of the second keel. The range of the genus is (Nukumaruan) Middle Pliocene to Recent.

Key to Species of Paracomitas.

Submedian bluntly rounded peripheral keel, with a secondary basal angulation.

- Peripheral keel smooth .... **protransenna* (Marshall & Murdoch)
- Peripheral keel with oblique gemmules .... *augusta* (Murdoch & Suter)
- Basal angulation slight, defined by a stronger cord.
  - Axials confined to peripheral keel.
    - Axials 20-22 per whorl, narrow, oblique.............. **castlecliffensis* (Marshall & Murdoch)
    - Axials 16 per whorl, gemmulate on heavy peripheral fold .... **gemmea* (Murdoch)

Submedian peripheral keel coronated by axials.

- Basal angulation obsolete.
  - Axials extending below periphery.
    - Axials 15-20 per whorl .... *gypsata* (Watson)

Paracomitas protransenna (Marshall & Murdoch, 1923).

1923 *Surcula protransenna* Marshall & Murdoch. Trans. N.Z. Inst. 54, p. 126, Pl. 12, f. 6.
1924 *Parasyrinx protransenna* : Finlay. Trans. N.Z. Inst. 55, p. 514.

Holotype in Wanganui Public Museum.
Locality: Waikopiro, Block 10, Takapau S.D., 4 miles S.E. of Ormondville (Holotype); Kereru Road, 1st Stream, Hawke's Bay (Nukumaruan) Middle Pliocene.

Paracomitas castlecliffensis (Marshall & Murdoch, 1919). Pl. 10, fig. 1.

1919 *Surcula castlecliffensis* Marshall & Murdoch. Trans. N.Z. Inst. 51, p. 255.

Holotype in Wanganui Public Museum.
Locality: Castlecliff, Wanganui. (Castlecliffian) Upper Pliocene.

Paracomitas gemmea (Murdoch, 1900).

1900 *Pleurotoma gemmea* Murdoch. Trans. N.Z. Inst. 32, p. 217, Pl. 20, f. 9.

Holotype in Wanganui Public Museum.
Locality: Blue-clay cliffs west of Wanganui Heads (=Castlecliff). (Castlecliffian) Upper Pliocene.

The above two species are closely allied, but the former always has the axials more numerous (20-22) weak and very oblique, whereas in the latter the axials are much stronger (averaging 16), erect, and arranged on a heavy fold-like keel, reminiscent of some species of *Gemmula*.

Paracomitas augusta (Murdoch & Suter, 1906).

1906 *Pleurotoma (Leucosyrinx) augusta* Murdoch & Suter. Trans. N.Z. Inst. 38, p. 286, Pl. 22, figs. 14-17.
1913 *Turris augusta* Suter. Man. N.Z. Moll. p. 472.

Holotype in Dominion Museum, Wellington.
Locality: 110 fathoms off Great Barrier Island.

Paracomitas gypsata (Watson, 1881).

1881 *Pleurotoma (Drillia) gypsata* Watson. Journ. Linn. Soc. 15, p. 413.
1886 *Pleurotoma (Surcula) gypsata* Watson. Challenger Zool. 15, p. 297, Pl. 25, f. 1.
1913 *Surcula gypsata* Suter. Man. N.Z. Moll. p. 486.

Holotype in British Museum (Natural History).
Locality: East of East Cape in 700 fathoms.

Genus **Insolentia** Finlay, 1926.

Type (o.d.) : *Pleurotoma parcoraensis* Suter. (Awamoan) Middle Miocene, N.Z.

This Lower Tertiary group is allied to *Turricula*, but has a very different protoconch, which is polygyrate, conic, of three to four smooth whorls, followed by a wider whorl with rather distant, arcuate, axial riblets, as compared with a bluntly rounded apex of one and a half whorls, followed by one whorl of rather distant, oblique axials in *Turricula javana*, a close relative of the genotype of *Turricula*. Otherwise the genus closely resembles *Turricula*, the shells being elongate-fusiform with a long unnotched canal, a moderately broad, flat rib submargining the suture, and a moderately deep sinus on the shoulder. The distribution of *Insolentia* is Bortonian to Awamoan (Middle Eocene to Middle Miocene) in New Zealand, and it is represented in Australia by the (Janjukian) Lower Miocene *Pleurotoma johnstoni* Tenison-Woods.

Key to Species of Insolentia.

1. Shell large (35-60 mm.).
   - Surface with numerous narrow spiral cords and threads.
     - Axial tubercles strong, narrowly rounded, 12 per whorl, restricted to peripheral keel; persistent throughout .... **laciniata* (Suter)
     - Axial tubercles low, blunt, 9 per whorl, obsolete on last whorl .... **sertula* (Suter)
2. Shell small (6.5-15 mm.).
   - Shoulder smooth.
     - Surface with sharply raised narrow spiral cords.
       - Axials 9 per whorl on upper spire whorls, absent from penultimate and body-whorls **inaequalis* Marwick
     - Surface with very weak spiral sculpture.
       - Axials 9-10 per whorl, strong, broadly rounded .... **famelica* Marwick
       - Axials 9-10 per whorl, as pointed carinated tubercles .... **elegantula* n. sp.
       - Axials about 16 per whorl, small peripheral tubercles .... **seminuda* (Suter)
     - Surface with numerous linear-spaced spiral cords.
       - Axials 14-15 per whorl, weak, very oblique .... **parcoraensis* (Suter)

Insolentia laciniata (Suter, 1917).

1917 *Surcula laciniata* Suter. N.Z. Geol. Surv. Pal. Bull. 5, p. 50, Pl. 6, f. 7.
1920 *Turris curialis* Marshall & Murdoch. Trans. N.Z. Inst. 52, p. 133.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: Waihao Downs (type of *laciniata*); Hampden (type of *curialis*) (Bortonian) Middle Eocene.

Insolentia sertula (Suter, 1917).

1917 *Surcula sertula* Suter. N.Z. Geol. Surv. Pal. Bull. 5, p. 53, Pl. 6, f. 13.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Waihao Downs. (Bortonian) Middle Eocene.

Insolentia inaequalis Marwick, 1931.

1931 *Insolentia inaequalis* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 144, Pl. 16, f. 306.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: N.Z.G.S. loc. 1236 (type) and 1240, Ihungia Series, Gisborne. (Hutchinsonian) Lower Miocene.

Insolentia famelica Marwick, 1931.

1931 *Insolentia famelica* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 144, Pl. 16, f. 305.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z.G.S. loc. 1236, Ihungia Series, Gisborne. (Hutchinsonian) Lower Miocene.

A probable new species directly ancestral to *famelica* is represented by a single specimen from N.Z.G.S. loc. 1903. Sandstone, west bank of Kyeburn R. 10 ch. E. of Archer's

Crossing and 30 ch. E.S.E. of Trig. D., Kyeburn S.D. (S.W.) (Waitakian) Upper Oligocene. The Ihungian *famelica* is based upon an immature shell of 4 post-embryonic whorls. The Kyeburn shell has 5½ post-nuclear whorls and appears to represent a narrower form with a more steeply descending shoulder, but more material is required to decide its status.

Insolentia pareoraensis (Suter, 1907).

1907 *Pleurotoma pareoraensis* Suter. Proc. Malac. Soc. 7, p. 208, Pl. 18, f. 3.
1915 *Surcula pareoraensis* : (Suter). N.Z. Geol. Surv. Pal. Bull. 3, p. 36.
1917 *Surcula obliquecostata* Suter. N.Z. Geol. Surv. Pal. Bull. 5, p. 52 (non *Pleurotoma (Surcula) obliquicostata* Martens, 1901).
1926 *Insolentia pareoraensis* : Finlay. Trans. N.Z. Inst. 56, p. 252.

Holotype in Wanganui Public Museum.
Localities: White Rock River. (Awamoan) Middle Miocene.

Insolentia seminuda (Suter, 1917).

1917 *Surcula seminuda* Suter. N.Z. Geol. Surv. Pal. Bull. 5, p. 52, Pl. 12, f. 16.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Tuffs interbedded in Amuri limestone, Coleridge Creek, Trelissick Basin, Canterbury. Miocene.

Dr. H. J. Finlay, who carefully examined the type, considers it an *Insolentia* close to *pareoraensis* and *elegantula*.

Insolentia elegantula n. sp. Pl. 10, fig. 7.

Shell rather small, narrowly fusiform, with a long, straight, unnotched anterior canal. Whorls 8, including typical, smooth, sharply conical, polygyrate protoconch of three to four whorls. Whorls strongly angled just below the middle, shoulder concave. Suture submargined by a moderately broad rounded fold. Oblique, strong axial tubercles persist over all post-nuclear whorls, nine or ten on penultimate. These tubercles are slightly carinated at the peripheral angle, do not extend over the shoulder, just reach the lower suture on the upper whorls, but fade out before reaching the lower suture, on and after the penultimate. Spiral sculpture of weak striations, cutting the surface into low, flat, broad cords, more distinct below the peripheral angle and on the upper part of the base than on the shoulder. Outer lip with a moderate sinus occupying the shoulder. The species is allied to *famelica* Marwick, 1931, but that species is not so elongate, has the angulation higher, the axials more vertically extended and the spirals restricted to the neck. From *sertula* (Suter, 1917) the new species differs in being much more slender, of smaller adult size, and with stronger and more tubercular axials, not tending to become obsolete over the body-whorl.

Height, 14.15 mm.; diameter, 4.7 mm. (Holotype.)

Holotype in Auckland Museum (Dr. C. R. Law's collection).
Localities: Dyer's Run, Lower Waihao Valley (type); Ardgowan, near Oamaru. (Awamoan) Middle Miocene.

Genus **Tholitoma** Finlay & Marwick, 1937.

Type (o.d.) : *T. dolorosa* Finlay & Marwick. (Wangaloan) Upper Cretaceous. N.Z.

This genus, proposed for a Wangaloan species, was diagnosed as "Shell rather small, fusiform, strongly nodosely shouldered and spirally lirate. Protoconch dome-shaped, polygyrate, with a minute nucleus and 3½ smooth, rapidly increasing, strongly convex whorls, the first two planorbid, thence rapidly descending to end abruptly in a strongly curved sinus; no brephic sculpture or varix. Canal fairly long, gently twisted, not notched anteriorly, nor with any trace of a fasciole. Sinus Surculid occupying a flat excavated space on the outer part of the shoulder, but clear of the peripheral angle.

The genus is compared by its authors with *Eopleurotoma* Cossmann, 1889 (type *P. multicostata* Desh., Parisian Eocene) and *Hemipleurotoma* Cossmann, 1889 (type *Pl. archimedis* Bellardi, Miocene of Italy).

The subfamily position of this genus is doubtful, for it would appear by the position of the sinus to belong to the *Turriculinae*, but on the other hand relationship is suggested with both *Eopleurotoma* and *Hemipleurotoma*, the latter being an undoubted member of the *Turrinae*.

Tholitoma dolorosa Finlay & Marwick, 1937.

1937 *Tholitoma dolorosa* Finlay & Marwick. N.Z. Geol. Surv. Pal. Bull. 15, p. 85, Pl. 12, figs, 6, 7, 11.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Wangaloa. (Wangaloan) Upper Cretaceous.

Genus **Zemacies** Finlay, 1926.

Type (o.d.) : *Z. elatior* Finlay. (Hutchinsonian) Lower Miocene. N.Z.

This is an Austral derivation from *Apiotoma* Cossmann, of the Parisian Eocene. From *Apiotoma* it is distinguished by less staged and more slender shape, whorls drawn out and loosely clasping, very deep sinus on shoulder, the swinging forward of the outer lip far past its origin at the suture, and in particular by the regularly conic, 4-5 whorled, smooth glossy protoconch. In *Apiotoma* the protoconch as described by Cossmann (1896, p. 73) is "conoidal à bouton mamillé." Species of *Zemacies* frequently reach a much larger size than *Apiotoma*. Finlay (1926, p. 252) stated that true *Apiotoma* was represented in the Australian Tertiary by the (Janjukian) Lower Miocene *bassi* Pritchard, 1904. Other Australian Tertiary members are *Pleurotoma granti* Pritchard, 1904 (Balcombian) and *Turris janjukiensis* Chapple, 1934 (Janjukian), all of which possess the smooth, blunt, paucispiral protoconch of true *Apiotoma*. In New Zealand the range of *Zemacies* is (Wangaloan) Upper Cretaceous to (Opoitian) Lower Pliocene., but the genus occurs in the Australian Tertiary (Janjukian) also, as represented by a new species from Torquay, which although superficially similar to *Apiotoma bassi*, has the tall, polygyrate, sharply conic protoconch of *Zemacies*. No *Apiotoma*, however, is so far known from New Zealand.

Key to N.Z. Species of Zemacies.

1. Shell narrowly fusiform; whorls increasing normally.
    Periphery bluntly rounded.
        Shoulder steep, wide and shallow.
            Shell very large, up to 100 mm. Axials obsolete .... *gravida* (Marshall)
            Shell small, 24 mm. Axials 13 per whorl, obsolete over lower whorls
            immatura Finlay & Marwick
2. Shell very narrow; whorls rapidly increasing—drawn out.
    Axials obsolete .... *awakinoensis* n. sp.
        Axials oblique, narrow, not reaching either suture, 18-20 per whorl.
    Axials developed on early spire-whorls only .... *elatior* Finlay
    Axials persistent throughout.
        Body-whorl narrow, parallel-sided medially.............................. *lividorupis* Laws
        Body-whorl wider at periphery, then regularly tapered .... *prendrevillei* Marwick
    Axials nodular. more or less restricted to peripheral keel.
        Subsutural margining fold strong .... *marginalis* (Marshall)
        Subsutural margining fold weak, obsolete on later whorls.
            Nodules few, 7 per whorl, very strong throughout .... *armata* n. sp.
            Nodules about 12 per whorl, later becoming obsolete .... *hamiltoni* (Hutton)
        Subsutural margining fold obsolete.
            Nodules strong; on raised peripheral fold.
                16 per whorl .... *ordinaria* (Marshall)
                21-22 per whorl .... *climacota* (Suter)
            Nodules weaker; no raised fold, 17 per whorl .... *simulacrum* Laws
3. Shell very slender and drawn out, having unwound appearance.
    Axials long, narrow and obliquely flexuous .... *torticostata* (Marshall)

Zemacies immatura Finlay & Marwick, 1937.

1937 *Zemacies immatura* Finlay & Marwick. N.Z. Geol. Surv. Pal. Bull. 15, p. 87, Pl. 12, f. 10.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Boulder Hill. (Wangaloan) Upper Cretaceous.

Zemacies hamiltoni (Hutton, 1905).

1905 *Pleurotoma hamiltoni* Hutton. Trans. N.Z. Inst. 37, p. 472, Pl. 44, f. 1.

Holotype in Canterbury Museum, Christchurch.
Locality: Waihao Forks. (Bortonian) Middle Eocene.

Zemacies torticostata (Marshall, 1919).

1919 *Surcula torticostata* Marshall. Trans. N.Z. Inst. 51, p. 232, Pl. 17, f. 7.

Holotype in Wanganui Public Museum.
Localities: Hampden (type); Waihao Downs (old railway cutting). (Bortonian) Middle Eocene.

Zemacies gravida (Marshall, 1919).

1919 *Surcula gravida* Marshall. Trans. N.Z. Inst. 51, p. 231, Pl. 16, f. 4.

Holotype in Wanganui Public Museum.
Locality: Hampden. (Bortonian) Middle Eocene.

Zemacies marginalis (Marshall, 1919).

1919 *Surcula marginalis* Marshall. Trans N.Z. Inst. 51, p. 231, Pl. 17, f. 10.
1919 *Surcula equispiralis* Marshall. Trans. N.Z. Inst. 51, p. 232, Pl. 16, f. 3.
1920 *Surcula hampdenensis* Marshall & Murdoch. Trans. N.Z. Inst. 52, p. 134, Pl. 6, f. 7.

Holotype in Wanganui Public Museum.
Locality: Hampden. (Bortonian) Middle Eocene.

Zemacies armata n. sp. Pl. 4, fig. 6.

The species, which is represented by a single specimen minus the apical whorls and the canal, unmistakably belongs here. It is allied to *hamiltoni,* but differs from it and all known species of the genus in having very strong, rather distant, peripheral nodules, seven per whorl. The subsutural band is moderately wide and faint on the upper whorls, but obsolete on the body-whorl and penultimate. Spiral sculpture subobsolete, six faint spiral cords from peripheral angle to lower suture on upper whorls. Sinus moderately deep and rounded, situated at the middle of the shoulder.

Height (actual, sp. incomplete), 37.7 mm.; diameter, 14.5 mm. (Holotype.)

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Abandoned railway, Waihao Downs, South Canterbury. (Bortonian) Middle Eocene.

Zemacies lividorupis Laws, 1935.

1935 *Zemacies lividorupis* Laws. Trans. Roy. Soc. N.Z. 65, p. 35, Pl. 5, f. 12.

Holotype in Auckland Museum (Dr. C. R. Laws collection).
Localities: Otiake, Waitaki Valley (Waitakian) Upper Oligocene; Blue Cliffs, South Canterbury (type) (Awamoan) Middle Miocene.

Zemacies ordinaria (Marshall, 1918).

1918 *Surcula ordinaria* Marshall. Trans. N.Z. Inst. 50, p. 268, Pl. 20, figs. 4, 4a.

Holotype in Wanganui Public Museum.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Zemacies climacota (Suter, 1917).

1917 *Surcula climacota* Suter. N.Z. Geol. Surv. Pal. Bull. 5, p. 50, Pl. 12, f. 15.
1939 *Zemacies climacota* : Laws. Trans. N.Z. Inst. 68, p. 498.

Holotype in Otago University Museum, Dunedin.
Locality: Komiti Bluff (= Pakaurangi Point) Kaipara (Hutchinsonian) Lower Miocene.

Zemacies simulacrum Laws, 1935.

1935 *Zemacies simulacrum* Laws. Trans. Roy. Soc. N.Z. 65, p. 34, Pl. 5, f. 11.

Holotype in Auckland Museum (Dr. C. R. Laws collection).
Locality: Clifden, Southland (bed B on left bank of Waiau R.) (Hutchinsonian) Lower Miocene.

Zemacies elatior Finlay, 1926.

1926 *Zemacies elatior* Finlay. Trans. N. Z. Inst. 56, p. 252.
1935 *Zemacies elatior* : Laws. Trans. Roy. Soc. N.Z. Pl. 7, f. 10 (100 mm., extra large, from Ardgowan).
1937 *Zemacies elatior* : Finlay & Marwick. N.Z. Geol. Surv. Pal. Bull. 15, Pl. 17, figs. 5 & 10.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Clifden (band 4, type) Southland (Hutchinsonian) Lower Miocene; Ardgowan, near Oamaru (Awamoan) Middle Miocene.

Zemacies awakinoensis n. sp. Pl. 14, fig. 4.

A descendant of the Hutchinsonian-Awamoan *elatior* in which the axial sculpture is still further reduced, being represented only by very weak growth folds, these being noticeable only over the last two whorls, where they have a slight but irregular development at the peripheral carina. The regularly developed axials of the early spire whorls of *elatior* are completely absent from *awakinoensis.* The species has the same general proportions as *elatior,* but the subsutural thread-margined platform is much weaker and the shoulder not so deeply excavated. The spiral sculpture is practically identical in strength and number of threads in both species; that is about twelve primary cords from the shoulder excavation to the lower suture, on the penultimate, with a few finer interstitial threads.

Height, 37.6 mm.; diamater, 14.7 mm. (actual dimensions of damaged holotype). Height, 76.0 mm.; diameter, 18.0 mm (estimated dimensions of example from loc. 2933).

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: N.Z. G.S. locs. 894, track at bend of Mokau River, ¾ m. S.S.W. of Pukewhero Trig., Awakino North S.D. (Holotype); 1056, 1 m. W.N.W. of Kotare Trig., and 1059, 50 chains east along road from bridge over Kotare Stream, end of formed road east from Kotare, Waro S.D., Taranaki; 2930, below high tide level, S. side of Awakino River mouth, about 6 ft. from top of Mokau beds; 2933, track north bank Mokau River at big bend 3 m. E. of Mokau Township, ¾ m. S.S.W. of Pukewhero Trig., Awakino North S.D. (Mokau beds = Awamoan) Middle Miocene.

Zemacies sp.

1931 *Zemacies* sp. Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 136, Pl. 18, f. 340.

Locality: Tutamoe Series (upper) 1350, Gisborne (Taranakian? or younger, fide Dr. H. J. Finlay).

Zemacies prendrevillei Marwick, 1928.

1928 *Zemacies prendrevillei* Marwick. Trans. N.Z. Inst. 58, p. 489, fig. 141, p. 506.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Flower-pot, Harbour, Pitt Id., Chatham Is. (Opoitian) Lower Pliocene.

COCHLESPIRINAE.

Genus **Tahusyrinx** n. gen.

Type: *Parasyrinx finlayi* Allan 1926. (Tahuian) Upper Eocene, N.Z.

The abyssal, Recent American *Leucosyrinx* and *Ancistrosyrinx* have an ancestry in that region linking up with *Cochlespira* Conrad, 1865 (type s.d. Cossmann 1896: *C. engonata* Conrad, not *Pl. cristata* Conrad, desig. by Casey 1904, or Dall 1908) from the middle Eocene of Texas. In the New Zealand Tertiary, the "Syrinx" group has been found to have several well marked local developments, while there is still another undescribed group from the Victorian Tertiary. Two New Zealand middle Tertiary groups have been defined:—*Parasyrinx* Finlay, 1924, and *Cosmasyrinx* Marwick, 1931: both are characterised by a paucispiral, smooth, blunt nucleus, and a simple shoulder, with a deep arcuate sinus, the former genus being smooth or weakly spirally lirate with a plain peripheral keel, and the latter with the keel rendered moniliform by regular axials.

The Upper Eocene (Tahuian) *Parasyrinx finlayi* Allan, 1926, with its small polygyrate apex and serrated keel, fits neither of these New Zealand groups, but bears some resemblance to *Ancistrosyrinx*, and in particular to *Cochlespira*, which by comparison, using an actual topotypic example of the genotype, is shown to differ from *finlayi* in having a much shallower and broader sinus, no serrations on the keel, and adult sculpture of dense spiral striations. *Ancistrosyrinx* has a strongly serrated keel, but differs in having the shoulder bisected by a lamellar spiral rib, with the true sinus subsutural, and a pseudo-sinus between this rib and the periphery.

Irenosyrinx, *Aforia*, and *Steiraxis* all differ considerably from the Tahuian species, which is here designated type of a new genus *Tahusyrinx*.

The distinctive characteristics of *Tahusyrinx* are the combination of an *Ancistrosyrinx* style of serrated keel, with a simple, deep, arcuate sinus, similar to that of *Cochlespira*, but much deeper, and a small polygyrate protoconch, quite different from the comparatively large, smooth, paucispiral apex of both *Parasyrinx* and *Cosmasyrinx*. No perfectly preserved examples of the *finlayi* protoconch are available, but a practically complete slightly eroded one is here figured (Text fig. C.5.).

Tahusyrinx finlayi (Allan, 1926).

1926 *Parasyrinx finlayi* Allan. Trans. N.Z. Inst. 56, p. 344, Pl. 77, f. 5.

Holotype in collection of Dr. R. S. Allan, Christchurch.
Locality: McCullough's Bridge, Waihao, South Canterbury (Tahuian) Upper Eocene.

Genus **Parasyrinx** Finlay, 1924.

Type (o.d.) : *Pleurotoma alta* Harris. (Awamoan) Middle Miocene, N.Z.

Shell fusoid; spire pagodiform; long slender unnotched canal; deep arcuate sinus, rather narrowly rounded medially; and a blunt, smooth paucispiral protoconch of two rounded whorls. The surface is smooth or weakly lirate, and the whorls bear a prominent sharp smooth keel, as well as a rounded basal angulation.

The genus is known only from New Zealand, occurring from the (Duntroonian) Upper Oligocene to the (Awamoan) Middle Miocene. Marshall & Murdoch's *Surcula protransenna*. included in *Parasyrinx* by Finlay (1924, p. 514) is a *Paracomitas*.

Key to Species of Parasyrinx.

Surface smooth.
Keel near lower suture .... **alta* (Harris)
Surface weakly spirally lirate from below the keel; lirations also slightly encroaching on shoulder, which is otherwise smooth .... **subalta* (Marshall & Murdoch)

Parasyrinx subalta (Marshall & Murdoch, 1919).

1919 *Leucosyrinx subaltus* Marshall & Murdoch. Trans. N.Z. Inst. 51, p. 256, Pl. 20, f. 7.

Holotype in Wanganui Public Museum.

Locality: Wharekuri (type) (Duntroonian); Otiake, Waitaki Valley; N.Z.G.S. locs. 493 "Pareora beds," Upper Kyeburn, Maniototo County; 1903, sandstone W. bank Kyeburn R. (Archer's Crossing), 30 ch. E.S.E. Trig. D.; 1904, greensand 1 m. S.W. Kyeburn Hotel, 110 chains E. of Trig. D.; 1905, lower bed of greensand at footbridge (west bank) near Coal-pit Gully, Kyeburn Survey District (Waitakian) Upper Oligocene.

Parasyrinx alta (Harris, 1897).

1873 *Pleurotoma pagoda* Hutton. Cat. Tert. Moll. N.Z., p. 5.

1897 *Pleurotoma alta* Harris. Cat. Tert. Moll. Brit. Mus. 1, p. 45, nom. nov. for *Pl. pagoda* Hutton, 1873, non Reeve.

1914 *Turris (Leucosyrinx) altus* : Suter, N.Z. Geol. Surv. Pal. Bull. 2, Pl. 2, f. 12.

1924 *Parasyrinx alta* : Finlay. Trans. N.Z. Inst. 55, p. 514.

Holotype in British Museum (Natural History).

Localities: Awamoa (type); Target Gully; Rifle Butts; Pukeuri and Ardgowan, near Oamaru (Awamoan) Middle Miocene.

Genus **Lirasyrinx** n. gen.

Type : *L. anomala* n. sp. (Duntroonian) Upper Oligo cene, N.Z.

This new genus is proposed for a single species having remarkable resemblance to *Parasyrinx subalta,* but with a very different protoconch. Whereas the protoconch in *Parasyrinx* is blunt, smooth and paucispiral of two rounded whorls, that of *Lirasyrinx* is obtusely conical of 2½ whorls with a smooth planorbid tip, followed by two rounded but rather depressed whorls that are strongly spirally lirate. The sinus is very deep and broadly rounded, occupying most of the shoulder. The keel is median, sharp, smooth, flange-like and strongly projecting. Otherwise the genus closely accords with *Parasyrinx.*

The genus is known only by the type species, which is from the (Duntroonian) Upper Oligocene at Wharekuri, Waitaki Valley.

Lirasyrinx anomala n. sp. Pl. 13, fig. 6.

Shell of moderate size, fusoid, with pagodiform spire. Whorls 7, including obtusely conical protoconch of 2½ whorls as described above. A smooth, sharp, broad, flange-like keel occupies a median position on the spire whorls; deeply concave both above and below it. Base with a distinct angulation in line with the suture. Spiral sculpture fine but distinct on the shoulder, and quite strong below the keel. There are 7 rather distant spiral threads on the shoulder, 5 linear spaced from below keel to lower suture, and a few exceedingly fine ones on the under side of the flange-like keel. The base is incomplete and the anterior canal missing from the two available examples, but there are indications that moderately strong linear-spaced spirals continue.

Height, 7.1 mm. (canal missing); diameter, 4.6 mm. (Holotype). Height, 12 mm. (canal missing); diameter, 7 mm. (Paratype).

Holotype and Paratype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z.G.S. loc. 1821, Wharekuri greensand, Waitaki River (Duntroonian) Upper Oligocene.

Genus **Cosmasyrinx** Marwick, 1931.

Type (o.d.) : *C. monilifera* Marwick (Ihungia Series = Hutchinsonian) Lower Miocene, N.Z.

Shell fusoid, with pagodiform spire, a long unnotched anterior canal, and deep, broadly arcuate sinus which occupies the shoulder. Protoconch paucispiral, smooth, erect, with large bulbous nucleus. A feature of the genus is the moniliform strongly projecting

peripheral keel. The range is (Ihungia Series = Hutchinsonian) Lower Miocene to (Tutamoe Series = Awamoan) Middle Miocene, N.Z. If the atypical *semilirata* n. sp. (described below) is really congeneric, and the horizon for it is correctly assigned, then the genus extends back to the (Duntroonian) Upper Oligocene.

Key to Species of Cosmasyrinx.

Peripheral keel gemmulate or tuberculate.
- Shoulder outline straight, steeply descending.
  - With a moniliform subsutural border .... **latior* Marwick
  - Without a subsutural border .... **ardua* Marwick
- Shoulder outline concave.
  - Strong subsutural border, weakly moniliform at first, then smooth.
    - Keel moniliform .... **monilifera* Marwick
  - Smooth subsutural border.
    - Keel with sharp tubercles .... **tereumera* Marwick

Peripheral keel gemmulate on 1-3 post-nuclear whorls only.
- Shoulder outline concave.
  - Upper part of shoulder smooth, lower part spirally lirate .... **semilirata* n. sp.

Cosmasyrinx semilirata n. sp. Pl. 14, fig. 9.

Shell fusoid, with pagodiform spire and long straight canal. Adult whorls 5; protoconch damaged and eroded. Spire whorls with a broad concave shoulder and a sharp peripheral keel, situated below the middle. Keel formed of three spirals, weakly nodulose over first three post-nuclear whorls; nodules subobsolete on penultimate and absent from the body-whorl. Spiral sculpture of threads and cords. Upper part of shoulder smooth, lower two fifths with six fine closely spaced but distinct threads. From the peripheral keel to the lower suture there are three cords, with a single minute thread in each interspace, and about thirty on the body-whorl, with occasional interstitials. The sinus is rather deep, broadly arcuate and occupies the whole of the shoulder.

Height, 13 mm.; diameter, 5.8 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 2563, 170 chains at 307° from Waihoka Corner, Longwood S.D., Orepuki (Duntroonian) Upper Oligocene.

Cosmasyrinx monilifera Marwick, 1931.

1931 *Cosmasyrinx monilifera* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 138, Pl. 16, f. 292.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: N.Z. G.S. locs. 1293 (type), 1294, 1295 Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Cosmasyrinx tereumera Marwick, 1931.

1931 *Cosmasyrinx tereumera* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 139, Pl. 16, f. 295.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1294 Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Cosmasyrinx ardua Marwick, 1931.

1931 *Cosmasyrinx ardua* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 138, Pl. 16, f. 293.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1243 Tutamoe Series, Gisborne (Awamoan) Middle Miocene.

Cosmasyrinx latior Marwick, 1931.

1931 *Cosmasyrinx latior* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 139, Pl. 16, f. 294.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: N.Z. G.S. locs .1260, 1262, 1359 and 1361 (type) Tutamoe Series, Gisborne (Awamoan) Middle Miocene.

CONORBIINAE.

Genus **Cryptoconus** von Koenen, 1867.

Type (s.d. Cossmann, 1889) : *Pleurotoma filosa* Lamarck. Eocene. Paris Basin.

? **Cryptoconus** n. sp. Pl. 10, fig. 10.

Two damaged and badly eroded fossils from the "Island Sandstone," Lower Waihao River (Bortonian) Middle Eocene, Canterbury, are not good enough for specific description, but serve to record this European Eocene genus, or a close ally of it, in New Zealand. Although the apical whorls are missing, the sinus and form of the outer lip and body-whorl seem quite typical.

Height, 25.4 mm.; diameter, 11.7 mm. (figured incomplete specimen) from Dr. H. J. Finlay collection, in Auckland Museum.

Genus **Austrotoma** Finlay, 1924.

Type (o.d.) : *Bathytoma excavata* Suter. (Hutchinsonian) Lower Miocene, N.Z.

This genus is one of the most characteristic of the New Zealand Tertiary *Turridae*, having a definite range of from the (Duntroonian) Upper Oligocene to the (Waitotaran) Lower Pliocene. The single (Wangaloan) Upper Cretaceous inclusion, *indiscreta*, cannot be placed with accuracy, as it is based upon an incomplete and atypical specimen. The absence of *Austrotoma* from the Bortonian and Tahuian Eocene makes the reference of *indiscreta* to that genus somewhat doubtful. The nearest related genus to *Austrotoma* is the Australian (Janjukian) Lower Miocene *Belophos*.

Both *Austrotoma* and *Belophos* show probable relationship with a series ranging from *Cryptoconus* and *Conorbis* of the European and English (Bartonian) Eocene through a later European Middle Tertiary product *Acamptogenotia* (= *Pseudotoma*) to the Recent *Vexitomina*, described herein, and the Californian *Megasurcula*. The European genera have a weak anterior notch, but *Belophos, Austrotoma* and *Vexitomina* possess a very deep anterior notch and a ridge-margined fasciole. In all, the sinus is shallow to moderate, occupying most of the shoulder, and the body-whorl is deep and ovate, Buccinoid, not constricted to a produced anterior canal. Each has its own distinctive protoconch, but those of *Austrotoma, Belophos* and *Acamptogenotia* are of the same general type, that of *Cryptoconus* being paucispiral and rather bulbous. The protoconch of *Austrotoma* is polygyrate of 4-5 whorls with a minute globular tip, the first three whorls being smooth and the remainder bearing strong flat-topped spiral cords and thin axials towards its close. In *Acamptogenotia* the tip is flattened and planorbid and the spiral cords of the last whorl are not crossed by axials. *Belophos* has a protoconch of the *Austrotoma* style, but of one whorl less; the three smooth whorls form a dome with a minute central nucleus and the last whorl is reticulated by thin crisp spirals and much heavier axials.

Dall referred the large Recent Californian *Pleurotoma (Surcula) carpenteriana* Gabb. to *Cryptoconus*, but the shell shows a well developed Buccinoid anterior notch and ridge-margined fasciole. *Megasurcula* Casey, 1904, was proposed for this species and its Californian Recent and Pliocene allies and should be used since the group shows the same parallel evolutionary advance on *Cryptoconus* as the deeply notched Austro-Neozelanic *Belophos* and *Austrotoma; Acamptogenotia* occupying a middle position in this development. In *Belophos* the axial sculpture is dominant, while in *Austrotoma* spiral cords exceed the axials in development. *Megasurcula* stands out from these related genera by its tall-spired, elongate-biconic shell and large size; in fact the genotype is one of the largest living Turrids, attaining a height of up to 100 mm.

Outside New Zealand the only undoubted species of *Austrotoma* are two new species from the Australian Tertiary, one from Table Cape, Tasmania, and the other from Spring Creek, Torquay, Victoria, both being (Janjukian) Lower Miocene. Both these species are

closely similar to the New Zealand *A. excavata,* the spiral sculpture being dominant, the axials suppressed except on the early whorls, and with a similar subsutural fold and shoulder excavation as well as a typical protoconch. *Belophos,* on the other hand, has strong axials throughout and a simple concave shoulder without subsutural fold. There are two unnamed related Australian Tertiary groups that require generic nomination. One typified by *Bela sculptilis* Tate, 1888 (Balcombian), resembles *Austrotoma* by the dominance of spiral sculpture, the axials being represented only by fine growth threads, and in the deeply notched anterior canal and ridge-margined fasciole, but the protoconch is quite dissimilar from that of either *Austrotoma* or *Belophos,* in having a large, smooth, rounded apex of 1½ whorls followed by a half whorl of close-spaced fine brephic axials. The post-nuclear whorls are rounded, with a weakly concave shoulder area and no subsutural fold. A second species is *Bela crassilirata* Tate, 1888 (Balcombian) and there are further undescribed species ranging from the Janjukian to the Adelaidean (Lower Miocene to Middle Pliocene). The second new group is represented by the Balcombian *Bela pulchra* Tate, 1888, which resembles *sculptilis* Tate in shape, the dominance of spiral sculpture, poorly defined shoulder area, and in the protoconch, which is similarly blunt and smooth-tipped of 1½ whorls (but even more depressed) followed by brephic axials. It differs radically, however, in having a very weakly notched anterior canal, with no ridge-margining of the fasciole.

It is likely that the *"Bela pulchra"* group bears a similar evolutionary relationship to *Belophos* and *Austrotoma* as that found in the *Cryptoconus* to *Acamptogenotia* series of the European Tertiary.

The following two new generic names are here proposed for the Australian Tertiary groups diagnosed above:—

Liratomina n. gen. Type : *Bela sculptilis* Tate, 1888. (Balcombian) Middle Miocene, Victoria.

Belatomina n. gen. Type : *Bela pulchra* Tate, 1888. (Balcombian) Middle Miocene, Victoria.

Key to N.Z. Species of Austrotoma.

1. Subsutural fold weak to moderate.
    - Spiral sculpture restricted to base.
        - Axials on early spire whorls only.
            - Shoulder angle rounded.
                - Subsutural fold moderate; sinus area distinct .... *_neozelanica_ (Suter)
                - Subsutural fold very weak; sinus area ill defined .... *_cryptoconoidea_ n. sp.
            - Shoulder angle sharp; broad smooth keel .... *_excavata_ (Suter)
    - Spiral sculpture dominant throughout.
        - Axials persistent over all whorls.
            - Few, broadly rounded, strong.
                - 11 per whorl, extending over base.................................. *_molinei_ Marwick
                - 12-13 per whorl, restricted to shoulder angle ....* _clifdenica_ n. sp.
            - Numerous, narrowly crested.
                - 14-16 per whorl, extending over base...................................... *_lawsi_ n. sp.
                - 21-30 per whorl, extending over base; shell elongated .... *_toreuma_ Marwick
        - Axials subobsolete over body-whorl.
            - 14 per whorl. Spirals narrow, not strong .... *_eximia_ (Suter)
            - 16-18 per whorl. Spirals strong, wider spaced .... *_minor_ (Finlay)
        - Axials entirely absent from body-whorl.
            - 16 per whorl. Spire-height less than aperture .... *_deducta_ Marwick
            - 16 per whorl. Spire-height greater than aperture .... *_inaequabilis_ Marwick
        - Axials on early spire whorls only.
            - Shoulder carina rounded, of 2-3 coalescent cords.
                - Spirals narrow, close spaced .... *_finlayi_ Powell
                - Spirals broader and wider spaced................................. *_kaiparaensis_ n. sp.

Shoulder carina sharply angled. Whorls straight sided.

Spirals wide spaced on base. Shell attenuated .... *prolixa* Laws

Spirals closer spaced on base. Shell normal .... *nervosa* n. sp.

Shoulder carina obsolete. Whorls rounded.

Spiral cords alternating with single strong interstitial threads. Shell abnormally large .... *ampla* n. sp.

Spiral sculpture developing prickly tubercles .... *echinata* n. sp.

2. Subsutural fold very strong and projecting.

Spiral sculpture dominant throughout.

Axials obsolete .... *obsoleta* Finlay

Axials numerous, rendering spirals gemmate................................ *gemmulata* n. sp.

Two species are omitted from the above key:—*A. indiscreta* Finlay & Marwick, 1937, which is not well enough preserved to allow generic reference with certainty, and *Voluta gracilicostata* Zittel, 1865, which is known to me only by the original figure of the holotype.

Austrotoma indiscreta Finlay & Marwick, 1937.

1937 *Austrotoma indiscreta* Finlay & Marwick. N.Z. Geol. Surv. Pal. Bull. 15, p. 88, Pl. 11, f. 9.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Boulder Hill, near Dunedin (Wangaloan) Upper Cretaceous.

Austrotoma toreuma Marwick, 1929.

1929 *Austrotoma toreuma* Marwick. Trans. N.Z. Inst. 59, pp. 923, 934, f. 72.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Chatton, Southland (Duntroonian) Upper Oligocene.

Austrotoma inaequabilis Marwick, 1929.

1929 *Austrotoma inaequabilis* Marwick. Trans. N.Z. Inst. 59, pp. 922, 934, f. 71.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Chatton, Southland (Duntroonian) Upper Oligocene.

Austrotoma eximia (Suter, 1917).

1917 *Bathytoma eximia* Suter. N.Z. Geol. Surv. Pal. Bull. 5, p. 54, Pl. 6, f. 15.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 493, Pareora beds, Kyeburn, Maniototo, Otago (Waitakian) Upper Oligocene.

Austrotoma finlayi Powell, 1938.

1929 *Austrotoma excavata* : Powell & Bartrum. Trans. N.Z. Inst. 60, p. 440. Non Suter, 1917.

1938 *Austrotoma finlayi* Powell. Trans. Roy. Soc. N.Z. 68, p. 375, Pl. 39, figs. 16, 17.

Holotype in writer's collection, Auckland Museum.

Localities: Otiake, Waitaki Valley (Waitakian) Upper Oligocene; near Oneroa, Waiheke Island, Auckland (Hutchinsonian) Lower Miocene. (Holotype.)

Austrotoma kaiparaensis n. sp. Pl. 3, fig. 9.

Shell of moderate size, biconic; spire slightly taller than aperture. Whorls 10, including typical polygyrate protoconch. Axials moderately strong, 16-17 per whorl, but confined to the first four post-nuclear whorls, the body whorl and penultimate being devoid of axials except for growth lines. Whorls keeled medially by a broad smooth spiral, margined above and below by weak spiral cords. Two primary spiral cords below keel on spire whorls, ten on body-whorl and base. These primary cords are distant, with one to three unequal subsidiary spirals in the interspaces. The sinus area bears nine fine crisp spiral threads. Aperture and sinus typical, except that the anterior canal is slightly truncated. The subsutural fold is very weak.

Height, 36.25 mm.; diameter, 15.75 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

The species is related to *finlayi*, but differs in having a shorter body-whorl, a more truncated anterior canal and fewer, more distant, spiral cords.

Austrotoma molinei Marwick, 1931.

1931 *Austrotoma molinei* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 148, Pl. 17, f. 316.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G. S. loc. 1236, Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene (Holotype); N.Z. G.S. loc. 1361, Tutamoe Series (Awamoan) Middle Miocene.

Austrotoma clifdenica n. sp. Pl. 3, fig. 4.

Shell narrowly biconic. Spire same height as aperture. Axials persistent over all post nuclear whorls, 12 on penultimate, broad but narrowly arched, strong and bluntly tubercular at peripheral keel, but rapidly diminished below, being obsolete at lower suture. Three to four close spaced spiral cords at periphery, 2-3 stronger wider spaced cords below on spire whorls. On the body whorl there are the 4 peripheral spirals followed by 14 narrow but strong prominently raised cords, upper ones wide spaced, but lower six crowded on neck. Shoulder broadly and deeply concave without a subsutural fold, sculptured with from 4 to 6 fine crisp spiral threads crossed by close-spaced growth lines, indicating a broad, moderate, arcuate sinus. Spiral interspaces on body whorl with occasional subsidiary threads and dense regular axial growth lines.

Height, 36.7 mm.; diameter, 15.2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Clifden (6b type and 6c), Southland (Hutchinsonian) Lower Miocene.

Austrotoma echinata n. sp. Pl. 3, fig. 5.

This species, although standing out from all other members of the genus by its squat shape and spiny sculpture, shows no essential departure from them in respect to the protoconch, aperture, sinus, anterior notch and rib-margined fasciole.

Shell rather small, broadly biconic. Spire about $\frac{3}{4}$ height of aperture. Whorls 9, including typical polygyrate protoconch of 5 whorls. Spire whorls with a weak subsutural fold, and just below the middle a sharp keel bearing strong vertically compressed prickly spines, marking the upper termination of broad low axials, which extend over the body-whorl to the neck, where they fade out gradually. These axials number 14 on the body-whorl. There are nine narrow but prominent cords on the body whorl, between the peripheral carina and the strong, sharp ridge margining the fasciole. The upper five of these cords bear spiny nodules where they cross the axials, and all spiral interspaces bear close fine spiral threads varying in number from 9-11 near the carina to 2-3 near the fasciole. The extremely wide sinus area bears twelve to fourteen, fine, crisp, spiral threads, these, and the subsidiary spirals of the whole shell being delicately reticulated by equally close axial growth threads. The sinus is shallow, exactly as in the genotype, except that it spreads over a wider shoulder, occasioned by the partial telescoping of the spire and adpressed clasping suture.

Height, 18.7 mm.; diameter, 10.2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Clifden (6c type and left bank C.) Waiau River, Clifden, Southland (Hutchinsonian) Lower Miocene.

Austrotoma excavata (Suter, 1917).

1917 *Bathytoma sulcata excavata* Suter. N.Z. Geol. Surv. Pal. Bull. 5, p. 55, Pl. 6, figs. 17, 18.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 542, Lower Komiti Point Beds (= Pakaurangi Point) Kaipara (Holotype); Clifden 6c, Southland (Hutchinsonian) Lower Miocene; White Rock River, South Canterbury; N.Z. G.S. loc. 2219, shellbeds, left bank Opihi River, 2 miles above junction with Tengawai River, Opihi S.D., South Canterbury (Awamoan) Middle Miocene.

The Clifden specimen exhibits traces of a zigzag pattern of broad brownish axial streaks, extending from suture to fasciole.

Austrotoma cryptoconoidea n. sp. Pl. 3, fig. 6.

Shell of moderate size, biconic, medially inflated, recalling *Cryptoconus.* Whorls 10, including typical protoconch of 5 whorls. Spire less than height of aperture. Sculpture obsolete, surface smooth except for close spaced axial growth lines on the early spire whorls and a few faint spiral threads on the neck of the canal. The concave shoulder so characteristic of the genus is very shallow and scarcely noticeable, and the subsutural fold is weak also, merely causing the suture to be slightly adpressed. The sinus is wide and very shallow, but the anterior canal is typical, being deeply notched and having a distinct fasciole defined by a sharply raised cord.

Height, 36.25 mm.; diameter, 16.3 mm.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (East side B) Southland (Hutchinsonian) Lower Miocene.
The species is nearest allied to *neozelanica* Suter.

Austrotoma neozelanica (Suter, 1913).

1873 *Pleurotoma sulcata* Hutton. Cat. Tert. Moll., p. 4. Non Lamarck.
1913 *Clavatula (Perrona) neozelanica* Suter. Trans. N.Z. Inst. 45, p. 294, Pl. 12, f. 3.
1916 *Bathytoma suteri* Cossmann. Rev. Crit. Paleozool. 20, No. 1, p. 9. Nom. nov. for *P. sulcata* Hutton.
1924 *Pseudotoma huttoni* Finlay. Proc. Malac. Soc. 16, p. 104. Nom. nov. for *P. sulcata* Hutton.

Holotype in Canterbury Museum, Christchurch.
Localities: Lower Gorge of Waipara (lower horizon), North Canterbury (Tongaporutuan) Upper Miocene (Holotype); Broken River, Canterbury (Holotype of *sulcata).*

Hutton's *sulcata* is much smaller than *neozelanica*, but the holotype of the former is too badly preserved for critical comparison.

Austrotoma lawsi n. sp. Pl. 3, fig. 8.

Shell of moderate size, narrowly biconic, resembling *minor,* but with narrower, more sharply raised spiral cords, a more contracted base, and axials persistent over the body-whorl. Spire only slightly less than height of aperture. Axials narrowly rounded, 14 on penultimate in holotype. Spiral cords clear cut, evenly developed and without intermediates except for dense microscopic lirations in all interspaces. There are six spirals on the spire-whorls and 16 on the body-whorl. On the shoulder there are four weak but sharply defined threads and these, as well as the subsidiary spirals of the whole shell, are reticulated by somewhat stronger dense axial growth lines. Subsutural fold distinct but not very prominent. Sinus broad and shallow, occupying most of the shoulder.

Height, 27.6 mm.; diameter, 12 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J .Finlay collection).
Localities: Blue Cliffs, South Canterbury (Holotype); N.Z. G.S. loc. 170, Awamoa Creek, near Oamaru, Otago (Awamoan) Middle Miocene.

Austrotoma minor (Finlay, 1924).

1877 *Bela ? robusta* Hutton. Trans. N.Z. Inst. 9, p. 595. Non Packard, 1869.
1924 *Belophos (Austrotoma) minor* Finlay. Trans. N.Z. Inst. 55, p. 515. Nom. nov for *Bela ? robusta* Hutton.
1926 *Austrotoma scopalveus* Finlay. Trans. N.Z. Inst. 56, p. 253, Pl. 57, figs. 19, 20.

Holotype in Otago University Museum, Dunedin *(robusta)*: Holotype of *scopalveus* in Auckland Museum Dr. H. J. Finlay collection).
Localities: White Rock River (type of *robusta)*; Target Gully, Oamaru (type of *scopalveus)*: N.Z. G.S. loc. 170, Awamoa Creek (Awamoan) Middle Miocene.

Shells from Kaawa Creek (Opoitian) Lower Pliocene, recorded by Bartrum and Powell (1928, p. 150) as *A.* cf. *scopalveus,* and specimens from N.Z. G.S. loc. 683, Esk River, Hawke's Bay (Waitotaran) Lower Pliocene are more elongated than *minor* and have more numerous axials. It is possible that they may be related to *gracilicostata,* but until topotypes of that species are available these Lower Pliocene shells must be left in doubt.

Austrotoma nervosa n. sp. Pl. 14, fig. 6.

Shell of moderate size, rather narrowly biconic. Spire whorls bluntly angled at three-fourths to four-fifths, with deeply concave shoulder and straight-sided vertical walls below. Body-whorl similarly straight-sided above, but gently contracted over base. Subsutural fold subobsolete. Spire shorter than aperture. Sculpture of moderate, rounded, clear-cut spiral cords, with interspaces 1 to $1\frac{1}{2}$ times width of the cords. These interspaces are smooth except for a single interstitial thread about the middle of the whorls. The spiral cords number from 6-9 below the shoulder on the spire whorls and about 20 on the body-whorl. Shoulder with from 5-7 crisp fine threads. Weak axials on first three post-nuclear whorls, about 15 per whorl.

Height, 44 mm.; diameter (actual), 15 mm. (estimated), 16 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Mt. Harris, Canterbury (Holotype); Dyer's Run, Lower Waihao Valley; Ardgowan, near Oamaru; N.Z. G.S. loc. 170, Awamoa Creek, near Oamaru; N.Z. G.S. loc. 2933, track, north bank Mokau River at big bend 3 miles east of Mokau Township and $\frac{3}{4}$ mile S.S.W. of Pukewhero Trig., Awakino North S.D. (Mokau Beds); N.Z. G.S. loc. 584, greensands under Mokau limestone (Awamoan) Middle Miocene.

This is a very distinctive and stable species easily recognised by its straight-sided whorls and simple, close-spaced spirals, without interstitial spirals except for the apparently invariable presence of a single medial thread.

An Ardgowan specimen has the colour pattern preserved, this being in the form of slightly flexuous axial streaks of reddish-brown, following the growth lines and confined to the cords, being absent from both the interspaces and the shoulder.

Related new species are represented in the Finlay collection by single specimens respectively from Otiake, Waitaki Valley (Waitakian) and Clifden (7b and 7c) Southland (Awamoan). These have the shoulder angle lower and differ in the absence of the medial interstitial thread, as well as in other sculptural details. Their description is withheld on account of insufficient comparative material.

Austrotoma gemmulata n. sp. Pl. 3, fig. 7.

Shell of moderate size, biconic, medially inflated; allied to *obsoleta,* having the subsutural fold very strong and projecting. Spire three-fourths height of aperture. Sculptured with close-spaced, regular, rounded spiral cords, crossed by equally closely spaced and only slightly broader axials, producing reticulation, the intersecting points being gemmulate. Three to four spirals on spire whorls, 14 on body-whorl. Shoulder concave, showing close axial growth lines, more distinct than the few faint spiral threads. Interspaces of spirals on body-whorl with one or two intermediate weak threads.

Height, 31.5 mm.; diameter, 14 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Clifden (7c) Southland (Awamoan) Middle Miocene.

Austrotoma obsoleta Finlay, 1926.

1926 *Austrotoma obsoleta* Finlay. Trans. N.Z. Inst. 56, p. 253, Pl. 55, figs. 13, 14.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Lower Gorge of Waipara (lower horizon), North Canterbury (Tongaporutuan) Upper Miocene.

Austrotoma gracilicostata (Zittel, 1865).

1865 *Voluta gracilicostata* Zittel. Voy. Novara Geol. 2, pt. 1, p. 38, Pl. 13, f. 6.
1931 *Austrotoma gracilicostata* : Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 148.

Holotype in K. K. Hofmuseum, Vienna.
Locality: The Cliffs, Nelson (Taranakian ?) Upper Miocene.

Austrotoma deducta Marwick, 1931.

1931 *Austrotoma deducta* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 148, Pl. 17, f. 315.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1322, Ormond Series, Gisborne (Urenuian) Upper Miocene.

Austrotoma prolixa Laws, 1940.

1940 *Austrotoma prolixa* Laws. Trans. Roy. Soc. N.Z. 70, p. 55, Pl. 5, f. 9.

Holotype in collection of Dr. C. R. Laws, Auckland.
Localities: Hawera (Holotype); N.Z. G.S. loc. 1171, sandstone on coast, ½ mile N.W. of Patea River Mouth (Waitotaran) Lower Pliocene.

Austrotoma ampla n. sp. Pl. 14, f. 5.

This is the largest known species of the genus, but apart from large size it is characterised by having strong wide-spaced spiral cords with a strong thread in each interspace. Like the other long ranging Pliocene Austrotomas, the spiral sculpture dominates the axial.

Shell abnormally large, fusiform, with elevated spire, estimated as slightly higher than aperture (lower part of aperture missing). Whorls moderately convex, with a blunt, not very prominent shoulder angle at ¾ whorl height. Suture submargined by a strong, broadly rounded fold. Sinus area concave, distinct. Spiral sculpture of strong but rather narrow sharply raised cords, 4-5 on spire whorls, uppermost at shoulder angle, but with an additional weaker spiral immediately above the shoulder. Body-whorl with about 14 primary spirals, having interspaces up to three times their width. Each interspace on both the penultimate and the body-whorl with a single strong spiral thread, which gives an alternating effect to sculpture of these later whorls. Sinus area and subsutural fold crossed by 9-10 fine crisp secondary spiral threads. The axial sculpture is restricted to about twenty faint riblets on the first and the second post-nuclear whorls.

Compared with the Waitotaran *prolixa* Laws, *ampla* is still larger, with less attenuated spire, more rounded whorls and fewer, wider spaced spiral cords.

Height, (actual) 68.5 mm., (estimated) 84 mm.; diameter, 30 mm. (Holotype).

Holotype (unique) in N.Z. Geological Survey Office, Wellington.
Locality: Embankment at north end of Awatere Railway Bridge, main road, Marlborough (Waitotaran) Lower Pliocene.

A similar outsized *Austrotoma* from N.Z. G.S. loc. 154, Kanieri River, Westland (Taranakian?) Upper Miocene, is represented by a single worn incomplete specimen. It is close to the above species, but lacks the subsutural fold, has more numerous spiral cords and the interstitial thread is weaker.

Genus **Vexitomina** n. gen.

Type: *Drillia metcalfei* Angas (Recent) New South Wales.

Finlay (1924, p. 516) noted that the Recent New South Wales "*Inquisitor metcalfei* Angas seems to be an *Austrotoma*, closely allied to the New Zealand *Drillia optabilis* M. & S." It is at once evident that *metcalfei* has nothing to do with *Inquisitor*, which is a *Drillia* in the broad sense, but certainly the species bears some resemblance to *Austrotoma*, having a similar deeply notched, short anterior canal, and ridge-margined fasciole, as well as a not dissimilar style of sculpture. Separation from *Austrotoma* is warranted, however,

on account of the attenuate spire of *metcalfei,* quite discordant from the biconic Austrotomas, and the deeper sinus with a more narrowly rounded apex. Unfortunately, I have no well preserved protoconchs of *metcalfei,* but it appears to be rather bluntly conical of about three whorls, and either smooth or but weakly sculptured.

Finlay's association of Murdoch & Suter's *optabilis* with *metcalfei* seems to be quite sound. Unfortunately, the protoconch in the unique New Zealand specimen is badly eroded also.

Vexitomina optabilis (Murdoch & Suter, 1906).

1906 *Drillia optabilis* Murdoch & Suter. Trans. N.Z. Inst. 38, p. 283, Pl. 21, fig. 9.

Holotype in Dominion Museum, Wellington.
Locality: 110 fathoms off Great Barrier Island.

Genus **Notogenota** n. gen.

Type: *Hemifusus (Mayeria) goniodes* Suter. (Bortonian) Middle Eocene, N.Z.

Superficially *Notogenota* resembles *Genota,* the genotype of which is the West African Recent *mitriformis* (Wood); the genus being known also from the European Oligocene to Pliocene.

Genota has a comparatively narrow sinus restricted by a broad, low, flat, subsutural fold, but this feature is absent in *Notogenota,* which has a broad, simple, shallow sinus, resembling that of *Surculites,* a long, straight unnotched anterior canal, elongate biconic outline, bluntly carinate whorls, and a large, smooth, polygyrate protoconch, with a minute styliform initial whorl. The protoconch is followed by a half-whorl of closely-spaced almost straight and vertical axial threads. The apices of both *Genota* and *Surculites* are very similar to that of *Notogenota,* except that the tip is blunt and lacks the styliform initial whorl.

Wrigley 1939 (p. 283) considered *Surculites* as occupying a "not too determinate position between the *Fusinidae* and the *Buccinidae* rather than with the *Turridae.* Wrigley's argument is that Fusoid genera frequently exhibit a shallow, broad-sinused shoulder, linked with, and proportionate to whorl carination, and that this alleged pseudo-sinus is weak at first but develops with the carina. Personally, I cannot confirm this statement in respect to *Surculites,* for well preserved examples of the (Bartonian) Eocene *errans* (Solander), the species upon which Wrigley based his argument, to me show the sinus quite well marked over all the early post-embryonic whorls. Wrigley contrasts the undoubted Turrid genus *Turricula* in which a deep narrow sinus originates immediately after the protoconch "without any transitional contours."

Two comments are relevant here—the "transitional contours" represent the brephic stage found in many protoconchs, and secondly, a narrow deep sinus occurs most frequently where the suture is submargined by a heavy fold, this restricting the width available on the shoulder for the development of the sinus. *Acamptogenotia, Belophos* and *Megasurcula* have each a wide shallow sinus comparable with that of *Surculites,* but *Genota* with its heavily margined suture has a Turriculid-like sinus.

I have, under *Austrotoma,* postulated an evolutionary sequence—*(Conorbis - Cryptoconus - Acamptogenotia - Belophos - Austrotoma - Vexitomina* and *Megasurcula)* which shows transition from a simple weakly-notched anterior canal in the Eocene *Conorbis* and *Cryptoconus* to the deeply notched and strongly carinate anterior canal and fasciole in the Recent *Vexitomina* and *Megasurcula.*

The Eocene *Surculites,* the New Zealand Eocene *Notogenota* nov. as well as *Marshallena* and *Marshallaria,* represent another series in which the anterior canal is long and unnotched. The range of *Notogenota* is New Zealand (Bortonian) Middle Eocene to (Tahuian) Upper Eocene.

Key to Species of Notogenota.

Axial sculpture well developed over all post-nuclear whorls.
  Spiral sculpture weak, but persistent over all post-nuclear whorls. Shell rather small (30-35 mm.) .... *finlayi n. sp.
Axial sculpture subobsolete, restricted to early whorls.
  Spiral sculpture microscopic, except for stronger spirals on lower part of base. Shell large (65-75 mm.).
    Spire height 0.72 of aperture .... *goniodes (Suter)
    Spire height 0.58 of aperture .... *pahiensis n. sp.

Notogenota goniodes (Suter, 1917).

1917 *Hemifusus (Mayeria) goniodes* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 23, Pl. 3, figs. 15, 16.
1917 *Surcula antegypsata* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 49, Pl. 6, f. 6.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 479, Waihao River, South Canterbury (= Waihao Downs. Type loc. of *goniodes*); Waihao greensands (= Waihao Downs. Type of *antegypsata*) (Bortonian) Middle Eocene.

Notogenota pahiensis n. sp. Text fig. D.19, p. 40.

1921 *Hemifusus (Mayeria) goniodes*: Marshall & Murdoch. Trans. N.Z. Inst. 53, p. 83. Not of Suter, 1917.

Although this species is known only from very badly preserved material, it is at once separable from *goniodes* by having a much longer and more slowly tapered body-whorl. The spire is 0.72 of the apertural height in *goniodes*, but only 0.58 in *pahiensis*. As far as can be judged from the available material, the sculpture is similar in the two species, i.e., dense microscopic spiral striae with stronger threads on the lower part of the base.

Height, (actual) 65 mm., (estimated) 75 mm.; diameter, 26 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Pahi greensands, Kaipara (Bortonian) Middle Eocene.

Notogenota finlayi n. sp. Pl. 3, fig. 10.

Shell rather small, elongate-biconic. Spire two-thirds height of aperture. Whorls 8, including a large smooth polygyrate protoconch of 5 whorls with a styliform tip as described above. Post-nuclear whorls bluntly angled above the middle. Suture slightly depressed, but not margined. Shoulder concave. The sculpture consists of weak close-spaced spiral threads, 7-8 very fine and indistinct on shoulder, 8 stronger from carina to lower suture on spire whorls, and about thirty-six below carina on body-whorl, base and anterior canal, with exceedingly fine intermediate striae. Axials numerous, flat-topped, of unequal widths, extending from suture to suture on spire whorls and over more than half the base on the body-whorl. Sinus broad and shallow, occupying the entire shoulder, thence the thin outer lip descends in a broad, evenly arcuate, protractive arc. Anterior canal straight, unnotched.

Height, 32.3 mm.; diameter, 12 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: McCullough's Bridge, South Canterbury (Tahuian) Upper Eocene.

N. goniodes is much larger, more strongly carinate, with exceedingly fine indistinct spiral striations, and weaker axials confined to the early post-embryonic whorls.

Genus **Marshallaria** Finlay & Marwick, 1937.

Type (o.d.): *Verconella spiralis* Allan (Tahuian) Upper Eocene, N.Z.

This genus and the following one, *Marshallena,* belong to a line of broad and shallow sinused Turrids comparable with the Upper Cretaceous and Eocene *Surculites* Conrad, 1865, type from the Eocene of New Jersey. The Turrid affinity of this latter genus is

discussed herein under *Notogenota*. I am indebted to Dr. J. Marwick for a more precise statement regarding the differentiation of *Marshallaria* from *Marshallena* than that contained in the original proposition of the former (Finlay & Marwick 1937, p. 83). Although both genera are superficially similar, each has a characteristic protoconch and sinus. *Marshallaria* has a regularly concave sinus throughout the post-nuclear whorls, while *Marshallena* (quoted as *Marshallia* in error, Finlay & Marwick 1937, p .84) has a very shallow one. The protoconch in *Marshallaria* is somewhat dome-shaped and has strong spiral cords on the last whorl: that of *Marshallena* is more regularly conic and appears practically smooth. It is likely that both genera had a common origin earlier in the Cretaceous. Both genera comprise moderate sized fusiform shells with gradate spires, about two-thirds apertural height, a well marked shoulder angle, and a fairly long unnotched anterior canal. The range of *Marshallaria* is (Wangaloan) Upper Cretaceous to (Awamoan) Middle Miocene, and that of *Marshallena* (Bortonian) Middle Eocene to (Waitotaran) Lower Pliocene. Both genera seem to be restricted to New Zealand.

Key to Species of Marshallaria.

Shell small (14-24 mm.).
- Axials very feeble; spirals dominant.
  - Spirals strong, linear spaced; beaded by axial threads.
    - Shell broad .... **senilis* (Marsh. & Murd.)
  - Spirals wider spaced; interspaces wider than width of cords.
    - Shell narrow .... **multicincta* (Marshall)
- Axials strong; broadly rounded.
  - Shell narrowly fusiform.
    - Axials 13 per whorl .... **formosa* (Allan)
  - Shell broadly fusiform.
    - Axials 13 per whorl .... **uttleyi* (Allan)
    - Axials 19 per whorl; spirals strong .... **spiralis* (Allan)
  - Shell larger (30-48 mm.).
    - Axials 22 per whorl not reaching upper suture but extending well over base .... **waitakiensis* n. sp.
    - Axials 15 per whorl, more or less confined to periphery .... **senta* n. sp.

Marshallaria multicincta (Marshall, 1917).

1917 *Daphnella multicincta* Marshall, Trans. N.Z. Inst. 49, p. 457.
1917 *Daphnella ovata* Marshall, Trans. N.Z. Inst. 49, p. 457.
1937 *Marshallaria multicincta* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 84, Pl. 11, figs. 10-12.

Holotype in Otago University Museum, Dunedin.
Locality: Wangaloa (Wangaloan) Upper Cretaceous.

Marshallaria senilis (Marshall & Murdoch, 1920).

1920 *Siphonalia senilis* Marsh. & Murd., Trans. N.Z. Inst 52, p. 131, Pl. 6, f. 4.
1937 *Marshallaria senilis* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 84.

Holotype in Wanganui Public Museum.
Locality: Hampden, North Otago (Bortonian), Middle Eocene.

Marshallaria uttleyi (Allan, 1926).

1926 *Verconella uttleyi* Allan, Trans. N.Z. Inst. 56, p. 340, Pl. 76, f. 6.
1937 *Marshallaria uttleyi* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 84.

Holotype in collection of Dr. R. S. Allan, Christchurch.
Locality: Island sandstone, Lower Waihao River (Bortonian), Middle Eocene.

Marshallaria formosa (Allan, 1926).

1926 *Verconella formosa* Allan, Trans. N.Z. Inst. 56, p. 340, Pl. 76, f. 7.
1917 *Surcula serotina* Suter (partim) N.Z. Geol. Surv. Pal. Bull. 5, Pl. 4, f. 15 (only).
1937 *Marshallaria formosa* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 84.

Holotype in collection of Dr. R. S. Allan, Christchurch.
Locality: McCullough's Bridge (Tahuian), Upper Eocene.

Marshallaria spiralis (Allan, 1926).

1926 *Verconella spiralis* Allan, Trans. N.Z. Inst. 56, p. 340, Pl. 76, f. 9.
1937 *Marshallaria spiralis* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 84.

Holotype in collection of Dr. R. S. Allan, Christchurch.
Locality: McCullough's Bridge (Tahuian), Upper Eocene.

Marshallaria waitakiensis n. sp. Pl. 3, fig. 11.

Shell of moderate size. Whorls sharply angled just above the middle, resulting in a broad, slightly concave shoulder, nine, including typical dome-shaped protoconch, with the last whorl sculptured with strong spiral cords. Spire about two-thirds height of aperture, gradate. Post-nuclear sculpture of close-spaced, regular, strong, bluntly rounded axials, rapidly diminishing over shoulder and not reaching upper suture; similarly diminished on base, although weakly persistent right to the fasciole; 22 on penultimate. Spiral sculpture of 4-5 narrow primary threads from angle to lower suture, and three to four secondary threads in each interspace. Two or three primary threads immediately above shoulder angle as well as a dense pattern of very fine secondary spirals. Secondary spiral threads over the whole shell delicately reticulated by dense axial threads. Body whorl with about 25 primary spirals with 2-4 intermediates. Base gradually contracted to a moderately long neck and unnotched anterior canal. Pillar decidedly twisted, with a distinct ridge and slight fasciole. Sinus typical, regularly concave. Sole example slightly distorted.

Height, 30.8 mm.; diameter, 14 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Otiake, Waitaki River, North Otago (Waitakian) Upper Oligocene.

Marshallaria senta n. sp. Pl. 14, fig. 3.

Species descended from *waitakiensis;* differing in being much larger, with fewer, more broadly rounded axials, more or less confined to the periphery, and more numerous spiral threads. Shell large, whorls sharply angled above the middle, shoulder broad and shallowly concave. Whorls 10, including typical protoconch of 4 whorls. Spire less than height of aperture. Axials 15 per whorl, bluntly rounded at periphery, rapidly fading out both on the shoulder and towards lower suture, which they reach only on the early spire whorls; practically confined to the periphery on later whorls and subobsolete to obsolete on the body-whorl. Spiral sculpture of fine dense primary and secondary spiral threads. From 12-14 weak simple spirals on shoulder, 7-10 primary spirals with 1-2 intermediates between shoulder angle and lower suture, and about 30 primary cords with from 2-4 intermediates on the body-whorl. Secondary spirals delicately reticulated by growth lines as in *waitakiensis.* Sinus typical, regularly broadly concave.

Height, 48.5 mm.; diameter, 21 mm. (Holotype).

Holotype (unique) in N.Z. Geological Survey Office.
Locality: N.Z. G.S. loc. 1218 Rifle Butts, Oamaru (Awamoan) Middle Miocene.

This is the largest known *Marshallaria* and, so far as is known, it is the last of the genus. The culminating species of the genera *Marshallaria, Marshallena* and *Austrotoma* all reached abnormally large size, as a prelude to extinction; an interesting analogy to this same tendency in respect to extinctions in certain birds and mammals.

Genus **Marshallena** Allan, 1926.

Type (monotypy): *Daphnella neozelanica* Suter, 1917 (Tahuian) Upper Eocene, N.Z.

(*Footnote, Trans. N.Z. Inst. 57, p. 291. Name having page priority over *Marshallena* Finlay, 1926, l.c. p. 413.)

The characteristics of this genus are given under the preceding genus *Marshallaria*. Range (Bortonian) Middle Eocene to (Waitotaran) Lower Pliocene.

Key to Species of Marshallena.

Shell small (12-21 mm.).
- Peripheral angle sharp to carinated.
  - Spirals evenly developed on spire (below carina) and base.
    - Axials 16 per whorl, blunt, strong on base.
      - Spirals 4-5 (below carina) on spire.................................. **curtata* (Marwick)
    - Axials 17 per whorl, blunt, rapidly diminished on base.
      - Spirals 6 (below carina) on spire .... **carinaria* Powell
    - Axials 27-33 per whorl, narrow, crisp.
      - Spirals 4-5 (below carina) on spire.............................. **neozelanica* (Suter)

Shell small to moderate sized (15-40 mm.).
- Peripheral angle bluntly rounded.
  - Axials well developed over all post-nuclear whorls.
    - Spirals more prominent on base than on spire.
  - Axials 13 per whorl.
    - Spirals fine, subequal and numerous on spire (shoulder included); distant weak primaries appearing on base .... **serotina* (Suter)
    - Spirals very fine and dense on spire; with addition of 3-4 indistinct primaries; basal primaries broad and strong .... **impar* n. sp.
  - Axials 13, decreasing to 11 per whorl.
    - Spirals 3-5 primaries with 2-8 fine intermediates .... **decens* Marwick
  - Axials 17-19 per whorl.
    - Spirals fine, numerous and subequal on spire whorls .... **celsa* Marwick
- Spirals trellised and rendered moniliform by numerous axial growth lines.
  - Axials 15 per whorl.
    - Spirals 4-5 on spire whorls .... **esdailei* (Marwick)
- Axials very weak on spire whorls becoming obsolete on last whorl.
  - Spirals exceedingly fine and numerous.
    - Axials 23 per whorl on spire .... **anomala* n. sp.

Shell large (78 mm.).
- Spire taller than aperture, straight-sided below angle.
  - Axials 14 per whorl .... **austrotomoides* Powell

Marshallena serotina (Suter, 1917).

1917 *Surcula serotina* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 52 (partim). Pl. 6, f. 12 only.
1926 *Marshallena serotina* : Finlay, Trans. N.Z. Inst. 57, p. 413.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Waihao Downs, South Canterbury (Bortonian) Middle Eocene.

Marshallena neozelanica (Suter, 1917).

1917 *Daphnella (Raphitoma) neozelanica* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 60, Pl. 7, f. 4.
1919 *Belophos incertus* Marshall, Trans. N.Z. Inst. 51, p. 229, Pl. 15, f. 3.
1926 *Belophos incertus* (= *neozelanica*) : Finlay, Trans. N.Z. Inst. 57, p. 413.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: Hampden, North Otago (Bortonian) Middle Eocene; McCullough's Bridge. "N.Z. G.S. loc. 630, Teaneraki, Enfield, near Oamaru," probably equals McCullough's Bridge (Tahuian) Upper Eocene (type of *neozelanica*).

Marshallena esdailei (Marwick, 1926).

1926 *Turricula esdailei* Marwick, Trans. N.Z. Inst. 56, p. 316, Pl. 72, f. 18.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Lorne, North Otago (Kaiatan) Lower Oligocene.

Marshallena anomala n. sp. Pl. 14, fig. 1.

Shell of moderate size, ovate-fusiform, resembling *Austrotoma,* but with unnotched anterior canal and very shallow sinus; features which accord with *Marshallena.* Whorls rounded but with a concave shoulder occupying the upper third. Sculptured with exceedingly fine and dense spiral threads and weak axials becoming obsolete over last half-whorl. Axials 23 per whorl, narrowly rounded and vertical. Spirals about 18 on shoulder and 26 from shoulder angle to lower suture; equally fine and numerous on upper portion of body-whorl, but becoming broader and more distinct below. Early whorls missing in sole example.

Height, 25.75 mm.; diameter, 12.3 mm. (Holotype, incomplete).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Target Gully, Oamaru (Awamoan) Middle Miocene.

An allied n. sp. which is much more inflated is represented by a specimen in the Finlay collection from the Kakanui tuffs, North Otago (Whaingaroan) ? Middle Oligocene.

Marshallena celsa Marwick 1931.

1931 *Marshallena celsa* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 147, Pl. 17, f. 314.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1775, Tutamoe Series, Gisborne (Awamoan), Middle Miocene.

Marshallena carinaria Powell, 1935.

1935 *Marshallena carinaria* Powell, Rec. Auck. Inst. Mus., 1, p. 336.

Holotype in writer's collection, Auckland Museum.
Locality: Motutara (volcanic tuffs) West Coast, Auckland (Awamoan) Middle Miocene.

Marshallena curtata (Marwick, 1926).

1926 *Turricula curtata* Marwick, Trans. N.Z. Inst. 56, p. 325, Pl. 74, fig. 8.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G. S. loc. 1141, coast 1 mile S. of Wai-iti Stream, Taranaki (Tongaporutuan) Upper Miocene.

Marshallena decens Marwick, 1931.

1931 *Marshallena decens* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 147, Pl. 17, f. 313.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G. S. loc. 1325, Ormond Series, Gisborne (Opoitian) Lower Pliocene; N.Z. G.S. loc. 1560 Waihua River ¾ mile upstream from Ngamahanga Stream, Wairoa S.D. (Waitotaran).

The sole example from loc. 1560 is larger than the type, measures 32.5 x 13.5 mm. and has more numerous axials, 15-16 instead of 13-11; otherwise it compares closely with the holotype.

Marshallena impar n. sp. Pl. 14, fig. 2.

The species is apparently descended from the Tutamoe *celsa,* for it exhibits the same feature of basal spirals stronger than those on the spire whorls. It differs in having a lower spire and fewer axials, and is of smaller size. Whorls 8, including protoconch of 4 whorls. Spire 1.4 times height of aperture. Peripheral angle above the middle, shoulder rather deeply concave. Axials 13 per whorl, bluntly rounded and slightly

oblique, extending from angle to lower suture and half way down the base. Spiral striae very fine and dense on shoulder; similar below the angle on spire whorls and upper part of base, but with the addition of 3-4 indistinct moderately broad, flat spiral cords

On the base there are 11 much stronger and wider flat-topped spiral cords with interspaces of $1\frac{1}{2}$ times their width; the uppermost of these basal spirals is in line with the top of the aperture. Sinus typical, broadly and shallowly concave.

Height, 23.75 mm.; diameter, 10.5 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 2329, 133 chains at 335° from Trig. P.1, Takapau (N.E.) S.D. Below uppermost Te Aute limestone, Dannevirke S.D. (Upper Waitotaran) Lower Pliocene.

Marshallena austrotomoides Powell, 1931.

1931 *Marshallena austrotomoides* Powell, Rec. Auck. Inst. Mus. 1, p. 106, Pl. 10, figs. 5, 6.

Holotype in Auckland Museum.

Localities: Waihi Stream, Hawera (Holotype); north bank Awatere River, Marlborough (King, 1934, p. 16); N.Z. G.S. loc. 1586, Makeretu Stream, sandstone above top limestone. Opoiti (S.W.) S.D., Wairoa (Waitotaran) Lower Pliocene.

CLAVINAE.

Genus **Drillia** Gray, 1838.

For over a hundred years *Drillia* has been the conventional dumping ground for all manner of Turrids having a short canal and deep subsutural sinus. Thiele (1929, p. 357) gave excellent figures of both the shell and the radula of the Recent West African genotype, *Drillia umbilicata* Gray, and also stated that the operculum has a terminal nucleus. Undoubtedly the radula of the genotype shows the genus in the restricted sense, to be of primitive stock, having a central and lateral teeth as well as prominent but simple marginals. In the higher Turrids both central and lateral teeth have been dispensed with, paired marginals only remaining.

Hedley (1922, p. 236) cited *Drillia* as a synonym of *Clavatula* Lamarck, 1801, but two very different groups are represented, for the latter has high clasping whorls, an operculum with a medio-lateral nucleus, and the fasciole is flattened and inconspicuous. True *Drillia*, besides having primitive dentition and an operculum with a terminal nucleus, has distinctive shell features in a strongly inflated fasciole producing a false umbilicus between it and the inner lip, a deeply notched anterior canal, as well as a very conspicuous subsutural sinus, and a well marked "Stromboid" notch in the lower portion of the outer lip. *Drillia* Gray, 1838, is therefore a valid genus for a primitive group of West African Turrids.

Hedley (1918, p.M. 79) provided the new genera *Inquisitor* and *Austrodrillia* for Austral groups of *Drillia* auct., and there are many names available for other series.

Two New Zealand *Drillia*-like groups have been in part referred to both *Inquisitor* and *Austrodrillia*, but this usage cannot be continued; they are diagnosed and named, following this discussion.

Typical *Austrodrillia* is close to *Compsodrillia* Woodring, 1928, from the Miocene of Jamaica; both have cylindrical protoconchs of two whorls, strong insertion callus at the top of the inner lip, and no "Stromboid"-notch in the lower outer lip. *Compsodrillia* differs from *Austrodrillia* only in having a weaker siphonal notch, a more distinct fasciole, and a heavy subsutural cord. True *Austrodrillia* does not occur in New Zealand, but a new subgenus (*Regidrillia*) is proposed herein for a deep water Three Kings Islands species. *Inquisitor* is discussed elsewhere in this bulletin.

Genus **Mauidrillia** n. gen.

Type: *Mangilia praecophinodes* Suter, 1917. (Awamoan) Middle Miocene, N.Z.

This genus is proposed for a group of small Austro-Neozelanic "Drillias" with a New Zealand range of from the (Duntroonian) Upper Oligocene to the (Opoitian) Lower Pliocene; but reaching Recent times in Southern Australia.

The genus is characterised by its globular protoconch of two smooth whorls, lack of insertion callus, broad, rather shallow, subsutural sinus occupying most of the shoulder, anterior canal very shallowly notched with oblique termination, and a weak "Stromboid"-notch in the lower portion of the outer lip. The sculpture is axial, crossed by spiral threads or cords. Subsutural cord present or absent.

In the Australian Tertiary, *Pleurotoma pullulasceus* Tenison-Woods, 1877 (Janjukian) may be included in *Mauidrillia,* for that species has the same style of protoconch and is strikingly similar in facies to New Zealand members such as *imparilirata* n. sp. and *inaequalis* n. sp. *Pleurotoma consutilis* Tenison-Woods, 1880 (Balcombian) appears to be allied also, the only really discordant feature being the lirate interior of the aperture. The genus reaches Recent times in Australian waters with *Drillia jaffaensis* Verco, 1909, from 130 fathoms off Cape Jaffa, South Australia. Possibly the deep water Tasmanian *Drillia schoutanica* May, 1911, belongs here also, but I have no material for actual comparison. Both these species were included in *Epideira* by Hedley (1922, pp. 229, 230).

Key to N.Z. Species of Mauidrillia.

A. Axial ribs 9-12 per whorl.
- Axials reaching both sutures.
  - Subsutural cord weak.
    - Shoulder with strong spiral cords, equal to those below periphery.
      - Axials 9-10 per whorl .... **cinctuta* (Marwick)
- Axials reaching lower but not upper suture.
  - Shoulder with weaker spirals than those below periphery.
    - Axials 9-10 per whorl, carinate at periphery .... **imparilirata* n. sp.
    - Axials 11-12 per whorl, bluntly rounded at periphery .... **inaequalis* n. sp.
- Axials bluntly nodulous, confined to periphery.
  - Subsutural cord strong.
    - Shoulder practically smooth.
      - Axials 9-11 per whorl .... **supralaevis* n. sp.
  - Subsutural cord weak.
    - Shoulder with cords equal to those below periphery.
      - Axials 9-12 per whorl .... **clavicula* n. sp.

B. Axial ribs 13-15 per whorl.
- Axials reaching both sutures.
  - Subsutural cord weak or obsolete.
    - Spirals rather strong below periphery, only one thread on shoulder.
      - Axials 15 per whorl, narrow, flexuous, slightly tubercular on keel ...... **unilirata* n. sp.
- Axials not reaching both sutures.
  - Spirals well developed on base, obsolete or subobsolete on spire.
    - Axials weak, oblique, not reaching either suture .... **praecophinodes* (Suter)
    - Axials stronger, tubercular on keel, less oblique, reaching lower suture only **costifer* (Suter)
  - Spirals numerous, well developed over whole shell.
    - Axials moderately strong, oblique, not reaching either suture .... **angustata* n. sp.
  - Spirals completely absent.
    - Axials 14 per whorl, tubercular at periphery .... **acuta* (Marwick)

Mauidrillia cinctuta (Marwick, 1929).

1929 *Austrodrillia cinctuta* Marwick, Trans. N.Z. Inst. 59, pp. 922, 934, f. 74.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Chatton, Southland (Duntroonian) Upper Oligocene.

Mauidrillia inaequalis n. sp. Pl. 1, fig. 11.

Shell of moderate size. Spire slightly higher than aperture plus canal. Whorls 7½, including typical, small, smooth protoconch of 1½ inflated whorls. Whorls strongly angulate just above middle, and with a deeply concave shoulder. Cord margining upper suture subobsolete. Axials broad, and rounded, 11-12 per whorl, not reaching upper suture, strongest at keel, and becoming weaker towards lower suture; absent from base. Shell crossed by fine, crisp, close spaced, spirals, weak on shoulder, but moderately strong below, and on base, neck and fasciole; 7-8 from peripheral angle to lower suture. Aperture rather small and narrow. Subsutural sinus rather broad and shallow. Lower outer lip with characteristic weak "Stromboid"-notch. Anterior canal of moderate length.

Height, 10 mm.; diameter, 4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Otiake (type) Waitaki Valley (Waitakian) Upper Oligocene; Blue Cliffs and Pareora River, South Canterbury (Awamoan) Middle Miocene.

Mauidrillia imparilirata n. sp. Pl. 1, fig. 8.

Shell smaller and more stumpy than *inaequalis,* with a shorter canal and the axials carinate at the peripheral angle. Whorls 5½, including typical protoconch of 1½ whorls. Whorls strongly angulate just above middle, and with a deeply concave shoulder. Sutural cord weak. Axials broad and rounded, carinate and weakly spinose at the angle, 9-10 per whorl, not extending to upper suture; very little diminished at lower suture, and absent from the base. Spirals very weak on shoulder, quite strong and crisp below, seven from peripheral angle to lower suture. Aperture as in last species, except that it is wider, and with a shorter canal.

Height, 6.8 mm.; diameter, 3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Pakaurangi Point, Kaipara (type); Awakino Gorge between road-tunnel and Mahoenui, blue mudstone between Te Kuiti and Mahoenui limestones (Hutchinsonian) Lower Miocene.

Mauidrillia supralaevis n. sp. Pl. 1, fig. 7.

Shell of moderate size. Spire 1½ times height of aperture plus canal. Whorls 7½, including typical protoconch of 1½ whorls. Whorls bluntly but strongly angulate at middle. Cord margining upper suture strong. Axials bluntly tubercular, not extending over shoulder, weak towards lower suture, 9-11 per whorl. Spiral sculpture absent from shoulder, four moderately strong spiral cords from angulation to lower suture, ten on base and neck, and a few weak threads on fasciole. Sinus very wide and comparatively deep, "Stromboid"-notch distinct.

Height, 10 mm.. diameter, 4.1 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Target Gully (type); Rifle Butts; Awamoa and Ardgowan, near Oamaru (Awamoan) Middle Miocene.

Mauidrillia clavicula n. sp. Pl. 1, fig. 12.

Shell small. Spire 1½ times height of aperture plus canal. Whorls 6½, including typical protoconch of 1½ whorls. Whorls strongly angled at middle. Cord margining suture weak. Axials as strong blunt knobs at angle, not extending to either suture, 9-12 per whorl, ten on penultimate in holotype. Spiral sculpture in one series of evenly spaced crisp cords, not differentiated on shoulder, nine on spire whorls, ten on base and neck, and about seven on fasciole. Apertural features typical, but anterior canal rather short.

Height, 8.25 mm.; diameter, 3.1 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Target Gully (Awamoan) Middle Miocene.

Mauidrillia unilirata n. sp. Pl. 1, fig. 10.

Shell of moderate size, fairly broad. Spire slightly taller than aperture plus canal. Whorls 6, including typical protoconch. Whorls strongly angulate just a trifle below the middle; with a deeply concave shoulder and a weak sutural cord. Axials numerous, 15 per whorl, thin and sinuous, extending from suture to suture. On the shoulder they are broadly arcuate following the sinus curve, while below they slope obliquely forwards; strongest medially, where they are slightly tubercular on the angle. On the shoulder there is a single median spiral thread. General spiral sculpture of moderately strong, rounded, linear-spaced cords, four below angulation on spire whorls, and about seventeen on base, neck and fasciole; those on neck slightly wider spaced, and those on fasciole weaker. Aperture of moderate size, anterior canal fairly short.

Height, 7.5 mm.; diameter, 3.2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Ardgowan, near Oamaru (Awamoan) Middle Miocene.

The species shows relationship with *cinctuta* (Marwick).

Mauidrillia praecophinodes (Suter, 1917).

1917 *Mangilia praecophinodes* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 56, Pl. 12, f. 18.

Holotype in Wanganui Public Museum.
Locality: Rifle Butts, Oamaru (Awamoan) Middle Miocene.

Mauidrillia costifer (Suter, 1917).

1917 *Drillia (Crassispira) costifer* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 48, Pl. 6, f. 5.

Holotype in Otago University Museum, Dunedin.
Locality: Pukeuri (type) and Awamoa, near Oamaru (Awamoan) Middle Miocene.

Mauidrillia angustata n. sp. Pl. 1, fig. 9.

Shell small, narrowly fusiform. Spire barely 1½ times height of aperture plus canal. Whorls 6½, including typical protoconch of 1½ whorls. Axials moderately strong, oblique, not reaching either suture, thickened and laterally compressed at periphery, fourteen on penultimate. Spiral sculpture equally strong both above and below periphery; seven primary cords on spire whorls, those below the angle with a tiny thread in each interspace. Aperture narrow, and canal long.

Height, 9.5 mm.; diameter, 3.4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Pukeuri, near Oamaru; Ardgowan (specimens not quite typical, but not separable) (Awamoan) Middle Miocene.

Mauidrillia acuta (Marwick, 1928).

1928 *Inquisitor acutus* Marwick, Trans. N.Z. Inst. 58, pp. 490, 506, f. 142.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Whenuataru Peninsula, Chatham Islands (Opoitian) Lower Pliocene.

Genus **Aoteadrillia** n. gen.

Type: *Pleurotoma wanganuiensis* Hutton, 1873. (Castlecliffian) Upper Pliocene, N.Z.

This genus is provided for a second group of small "Drillias," restricted to New Zealand and with a range from (Hutchinsonian) Lower Miocene to Recent.

The genus is characterised by a depressed papillate protoconch of two to three glossy whorls, the last whorl developing a blunt submedian carina, and typically (Group B) with the addition of upper and lower sutural submargining cords. These are absent in the Group A protoconch. Insertion callus lacking, sinus subsutural, typically rather deep,

U-shaped, restricted above by a heavy subsutural spiral cord. Anterior canal broadly and shallowly notched, with an oblique termination. Lower outer lip with a slight indentation, scarcely a "Stromboid"-notch. Sculpture of axials crossed by spiral cords or of strong spiral keels rendered gemmate or nodulous by the axials.

Group A has a range from Hutchinsonian (Lower Miocene) to Recent and Group B Waitotaran to Recent.

Key to Species of Aoteadrillia.

A. Protoconch depressed, papillate, of 2-3 smooth, glossy whorls; last whorl with a blunt submedian carina.

- Adult whorls with a very weak subsutural cord.
  - Shoulder bearing spiral threads.
    - Axials heavy, bluntly rounded, extending from half, to two-thirds whorl height.
      - Axials 8 per whorl, crossed by three primary cords .... **callimorpha* (Suter)
      - Axials 10-12 per whorl, crossed by bifid peripheral cord and single one below it *rawitensis* (Hedley)
      - Axials 11 per whorl, crossed by five primary cords .... *bulbacea* (Watson)
    - Axials restricted to a broad, massive, rounded peripheral keel.
      - Axials 12 per whorl, confined to keel .... *otagoensis* n. sp.
  - Shoulder without spiral threads.
    - Axials 7-9, tubercular, crossed by 4 cords .... **exigua* (Marwick)
    - Axials 9-11, tubercular, crossed by 4-6 cords .... **ihungia* (Marwick)

B. Protoconch with the addition of an upper and a lower sutural margining cord.

- Adult whorls with a prominent subsutural cord.
  - Shoulder bearing spiral threads.
    - Spire whorls with two nodulose keels; lower one the weaker and close to lower suture, no spiral cords beneath it.
      - Axials 11 per whorl, shell narrow, angle at lower third .... **waihuaensis* n. sp.
      - Axials 16-17 per whorl, shell broad, angle submedian .... **thomsoni* n. sp.
    - Spire whorls with two spiral cords beneath the two keels.
      - Axials 15-21 per whorl, crossed by four narrow cords .... *wanganuiensis* (Hutton)
        - Cords beneath keels weak or (typically) absent.
      - Axials 15 per whorl, crossed by two strongly gemmate cords .... *chordata* (Suter)
    - Spire whorls with three peripheral spirals, middle one strongest and nodulose.
      - Axials 15 per whorl, shell narrow, angle at lower third .... **trifida* n. sp.
    - Spire whorls with sparse, bluntly rounded heavy axials.
      - Axials 9 per whorl, crossed by three primary spiral cords; body-whorl suddenly contracted .... **consequens* (Laws)
      - Axials 9 per whorl, crossed by four primary spiral cords; body-whorl gradually contracted .... **apicarinata* (Marshall & Murdoch)
  - Shoulder bearing two strong cords in place of spiral threads.
    - Axials 20-22 per whorl, weaker than spirals .... **finlayi* n. sp.
  - Shoulder without spiral threads.
    - Axials 12 per whorl.
      - Axials broadly rounded heavy bisected by a weak linear median spiral groove **bisecta* n. sp.
    - Axials as a double peripheral series of vertically compressed nodules.
      - Two equally strong closely spaced peripheral keels .... **gamma* (King)
      - A bifid heavy upper keel and a weaker one close below .... **asper* (Marwick)
      - Axials restricted to a single median row of prominent pointed nodules .... **beta* (King)
    - Axials 14 per whorl.
      - Axials stout but narrowly crested, higher than width .... **alpha* (King)

Group A Protoconch.

Aoteadrillia exigua (Marwick, 1931).

1931 *Inquisitor exigua* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 142, Pl. 1, f. 304.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1292 Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Aoteadrillia ihungia (Marwick, 1931).

1931 *Inquisitor ihungia* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 143, Pl. 16, f. 302.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1237, Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Aoteadrillia callimorpha (Suter, 1917).

1917 *Drillia callimorpha* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 48.

Holotype in Otago University Museum, Dunedin.

Locality: Target Gully, near Oamaru (type) (Awamoan) Middle Miocene.

Aoteadrillia rawitensis (Hedley, 1922). Pl. 13, fig. 10.

1913 *Drillia angasi:* Suter (non Crosse 1863) Man. N.Z. Moll. p. 480.
1922 *Austrodrillia rawitensis* Hedley, Rec. Aust. Mus. 13, p. 248. Nom nov. for *Drillia angasi:* Suter, 1913; non Crosse, 1863.

Holotype: As Suter's Bay of Islands specimen cannot be found, an example in the writers' collection (11.4 mm. x 5 mm.) from Aurere, Doubtless Bay, is here designated as Neotype.

Localities: Bay of Islands (type); Cooper's Beach and Aurere (neotype), Doubtless Bay; Whangaparapara, Great Barrier Id.

Aoteadrillia bulbacea (Watson, 1881).

1881 *Pleurotoma (Drillia) bulbacea* Watson, J. Linn. Soc. 15, p. 418.
1886 *Pleurotoma (Spirotropis) bulbacea* Watson, "Challenger" Zool. 15, p. 325, Pl. 25, f. 9.
1913 *Spirotropis bulbacea* Suter, Man. N.Z. Moll., p. 483.

Holotype in British Museum (Natural History).

Locality: East of East Cape in 700 fathoms ("Challenger").

I have not seen this species, but from the good description and figure it almost certainly belongs here.

Aoteadrillia otagoensis n. sp. Pl. 2, fig. 8.

Shell of moderate size. Spire tabulated, one and a fifth times height of aperture plus canal. Whorls six, including a 2½ whorled, blunt, smooth protoconch, the last whorl with a weak submedian carination. Post-nuclear whorls with a massive rounded carinal bulge studded with heavy, bluntly rounded tubercles, 12 on penultimate whorl. Spire outline between the coils of the carina practically vertical. Upper suture margined by a very weak cord barely stronger than the normal spiral sculpture. Spiral sculpture weak, but distinct, of flat-topped cords with linear interspaces, three above carina, 6-8 much finer and indistinct on carina and two below of same strength as those above. On the base a moderate angulation occurs in line with the lower suture, and there are 19 moderate, flat-topped, linear spaced cords on base, neck and canal. Subsutural sinus broad, moderately deep, occupying the shoulder. Anterior canal long, only slightly curved.

Height 8.2 mm.; diameter, 3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: 50 fath. 10 miles E.N.E. Otago Heads (type); 72 fath. off Cape Saunders, Otago (Dr. C. R. Laws collection).

The species has a superficial resemblance to *Pleurotoma (Leucosyrinx) augusta* Murdoch and Suter, 1906, which is a *Paracomitas.*

Group B Protoconch.

Aoteadrillia asper (Marwick, 1926).

1926 *Inquisitor asper* Marwick, Trans. N.Z. Inst 56, p. 325, Pl. 74, f. 7.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1144, Okoke Road, 60 chains west of Pehu Trig, Upper Waitara Survey District (Urenuian) Upper Miocene.

Aoteadrillia gamma (King, 1933).

1933 *Austrodrillia gamma* King, Trans. N.Z. Inst. 63, p. 350, Pl. 36, f. 8.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Cliffs E. of Lake Ferry, Palliser Bay (Nukumaruan) Middle Pliocene.

Aoteadrillia beta (King, 1933).

1933 *Austrodrillia beta* King, Trans. N.Z. Inst. 63, p. 349, Pl. 36, f. 7.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: N.Z. G.S. loc. 2329, 133 chains at 335° from Trig P1, Takapau (N.E.) S.D. (Below uppermost Te Aute limestone) Dannevirke S.D. (Upper Waitotaran) Lower Pliocene. Cliffs E. of Lake Ferry, Palliser Bay (Nukumaruan) Middle Pliocene (type).

Aoteadrillia alpha (King, 1933).

1933 *Austrodrillia alpha* King, Trans. N.Z. Inst. 63, p. 349, Pl. 36, f. 6.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Cliffs E. of Lake Ferry, Palliser Bay (Nukumaruan) Middle Pliocene.

Aoteadrillia consequens (Laws, 1936).

1936 *Austrodrillia consequens* Laws, Trans. Roy. Soc. N.Z. 66, p. 121, Pl. 17, figs. 76, 78.

Holotype in Auckland Museum (Dr. C. R. Laws collection).
Locality: Kaawa Creek, S. of Port Waikato (Opoitian) Lower Pliocene.

Aoteadrillia apicarinata (Marshall & Murdoch, 1923).

1923 *Drillia apicarinata* Marshall & Murdoch, Trans. N.Z. Inst. 54, p. 125, Pl. 12, f. 5.

Holotype in Wanganui Museum.
Localities: Waikopiro. Dr. H. J. Finlay informs me that this locality is a big Maori settlement in Block X, Takapau S.D., approximately 4 miles S.E. of Ormondville, and that Suter's Waikopiro fossils are from the Petane series; Inner Harbour, Napier (Nukumaruan) Middle Pliocene.

Marshall and Murdoch's illustration shows too regular an outline, the shoulder and sinus area insufficiently differentiated, and a grossly exaggerated undulated suture. Actually, the species is very close to *consequens* Laws, 1936, which may be regarded as its immediate ancestor. From this species *apicarinata* differs chiefly in having a longer, gradually contracted base, and longer, less projecting axials.

Aoteadrillia thomsoni n. sp. Pl. 2, fig. 7.

Shell of moderate size, rather broad, with spire estimated as less than 1½ times height of aperture plus canal (neck and canal missing in holotype). Whorls 6½, including group B protoconch. Spire whorls with a heavy rounded cord margining upper suture, and a weak one at lower suture, immersed on upper whorls but emerging at the penultimate. There is a strong submedian angulation bearing numerous oblique laterally compressed axials which do not extend to the sutures; 16-17 on penultimate. This nodulous angulation is crossed by two moderately strong, close-spaced spiral cords, the upper one

more projecting and forming the peripheral angle. The shoulder bears from 4-6 distinct spiral threads. Sinus subsutural, typical. Two additional specimens received from the N.Z. Geological Survey after the figure was prepared show the base to have two moderate spiral cords situated high up, and about 16 fairly strong subsidiary threads below, those on the neck being finer and more closely spaced.

Height (actual; canal missing), 7.6 mm.; diameter, 5 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: East Shore of Lake Grassmere, Marlborough (Dr. J. A. Thomson) (Waitotaran); N.Z. G.S. loc. 2329, 133 chains at 335° from Trig P1, Takapau (N.E.) S.D. (Below uppermost Te Aute limestone) Dannevirke S.D. (Upper Waitotaran) Lower Pliocene.

Aoteadrillia waihuaensis n. sp. Pl. 12, fig. 14.

Species related to the Waitotaran *thomsoni,* but smaller, proportionately much narrower, and higher spired, with finer, more nodulous axials, and the peripheral keel set lower down at about one third whorl height. Spire 1½ times height of aperture plus canal; body-whorl somewhat truncated. Whorls 7, including group B protoconch. Subsutural cord heavy, broad and flat. Two main spiral keels on spire whorls, situated low down, one at the periphery and the other between it and the lower suture. Four fairly strong subsidiary spiral threads on the wide, steeply descending shoulder. Base with two moderate, smooth spiral cords, situated high up, one emerging from just beneath lower suture; rest of base with about 16 fairly strong subsidiary threads, those on neck and fasciole finer, and more closely spaced. Axials 11 per whorl, bluntly rounded, reaching lower suture, but rapidly fading out on shoulder, forming vertically compressed, bluntly rounded nodules where crossed by the two keels, the uppermost of which is the more prominent and forms the peripheral angle.

Height, 8.9 mm.; diameter, 3.4 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1560 Waihua River, ¾ mile upstream from Ngamahanga Stream, Wairoa S.D. (Waitotaran) Lower Pliocene.

Aoteadrillia trifida n. sp. Pl. 12, fig. 13.

Species resembling *waihuaensis* in size and general features, but with more numerous axials, different arrangement of the spiral keels, and stronger spiral cords on the base. Whorls 7, including group B protoconch. Subsutural cord heavy, broad and flat. Three keels on spire whorls, middle one strongest, forming a blunt angle at the lower third. Lower suture margined by a half emergent smooth cord forming uppermost of two rather strong smooth cords on upper part of base. Eight further moderately strong smooth cords below, and a series of finer and closer threads on the neck and fasciole. Axials broadly rounded, not reaching either suture, weakly nodulose where crossed by the main keel.

Height, 8 mm.; diameter, 2.9 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 2624, Arenaceous mudstone, roadside about half way down hill at Makara-Mangaopari Junction, Waipawa S.D. (Lower Nukumaruan) Middle Pliocene.

Aoteadrillia wanganuiensis (Hutton, 1873).

1873 *Pleurotoma wanganuiensis* Hutton, Cat. Tert. Moll. N.Z., p. 4.
1914 *Drillia wanganuiensis* Suter, N.Z. Geol. Surv. Pal. Bull. 2, p. 29, Pl. 2, f. 13.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: Pliocene: N.Z. G.S. loc. 2687, Road bend, 108 chains at 35° from Trig 55, Tahoraite (S.W.) S.D. Dannevirke S.D. (High up in Lower Nukumaruan); N.Z. G.S. loc. 2707, 123 chains at 207° from Trig T.1. Woodville (N.E.) S.D.; N.Z. G.S. loc.

2220, Devil's Elbow Rd., main road between head of Maipau Stream and Tararere, Arapawanui River, Block 16, Maungaharuru S.D., Petane beds; Petane; Inner Harbour, Napier (sands above blue-clay), Hawkes Bay (Nukumaruan) Middle Pliocene; Castlecliff (= Shakespeare Cliff, type); Kai Iwi, near Wanganui (Castlecliffian) Upper Pliocene. Recent: Tryphena Bay 5-6 fath., Great Barrier Island; near Oneroa, Waiheke Island, Auckland.

The species grouped around *wanganuiensis* originated from the Waitotaran *thomsoni,* a squat-spired shell in which the lower of the two peripheral keels is situated close to the lower suture, leaving no space for the appearance of lower spiral cords on the spire whorls. With the lengthening of the spire in subsequent species, several plain spiral cords emerge from beneath the main peripheral keels. The main line is represented by *wanganuiensis,* with a range from Nukumaruan to Recent. Divergent Nukumaruan forms are *bisecta,* in which the finer secondary spiral threads have disappeared and the axials have become prominently nodulous and bisected by a spiral grove, and *finlayi,* which has the spirals dominant and the axials much weaker and more numerous. Two forms of *wanganuiensis* occur throughout its range, the typical species having long axials crossed by three to four spiral cords, and the second form *chordata,* with shorter and stronger axials forming a double peripheral series of strong rounded nodules. The form *chordata* is here separated subspecifically, for although the two forms are undoubtedly closely allied, Recent examples of *chordata* seem to be restricted to the Forsterian province, whereas all the known Recent occurrences of *wanganuiensis* are from North Cookian localities.

As the whole group shows a tendency towards individual variation, only the more stable elements are here named. Several unique specimens from Nukumaruan localities do not exactly fit any of these species, but their description is withheld until series are available.

Aoteadrillia wanganuiensis chordata (Suter, 1908).

1908 *Drillia chordata* Suter, Proc. Mal. Soc. 8, p. 184, Pl. 7, f. 16.

Holotype in Wanganui Public Museum.

Localities: Pliocene. Petane, Hawkes Bay (A. Hamilton collection); N.Z. G.S. loc. 1590—railway cutting 55 chains N.E. of Leader Bridge, Hawkeswood S.W. Amuri, Kaikoura S.D. (Nukumaruan) Middle Pliocene. Recent. Dredged off Otago Heads (type); 60 fathoms off Otago Heads (H. J. Finlay coll.); 40-50 fath. off Cape Saunders, Otago (C. R. Laws coll.); 50 fath. off Oamaru (H. J. Finlay coll.).

The subspecies has not been located as yet in the Castlecliffian.

Only the Recent shells from 40-60 fathoms, Otago, are really typical. These have the two spiral keels heavily developed and bearing strong oval nodules at the axial intersections. Usually, the plain spiral cords below the keels are absent; when present they are weak and inconspicuous. The series of Nukumaruan examples tend closer to *wanganuiensis,* having the secondary spiral striae more pronounced than in typical *chordata.*

Aoteadrillia bisecta n. sp. Pl. 1, fig. 6.

Shell of moderate size. Spire tabulated, 1½ times height of aperture plus canal. Whorls eight, including typical, blunt, 2½ whorled smooth protoconch. Spire whorls with a heavy, smooth, rounded cord margining upper suture, a weaker but distinct one at lower suture, and a prominent rounded median bulge bearing heavy blunt knobs, 13 on penultimate. The spire is smooth, quite devoid of subsidiary spirals, except for a single weakly incised narrow groove which bisects the nodulous median bulge. On the base there are two close-spaced, heavy, rounded spiral cords, uppermost being the continuation of

the lower sutural cord of the spire (this being half immersed on all spire whorls), two wide spaced narrow, weak cords below, and eleven weak rounded cords, with a fine thread in each interspace, on neck and weak fasciole. Apertural features typical.

Height, 11.8 mm.; diameter, 4 mm.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: N.Z. G.S. loc. 2610, Makara Stream, about 50 chains up from Ruakakapatuna Junction, outcrop forming west bank of stream, Waipawa S.D. (Lower Nukumaruan); Petane, Hawke's Bay (type) (Upper Nukumaruan) Middle Pliocene.

Aoteadrillia finlayi n. sp. Pl. 1, fig. 5.

Shell of moderate size. Spire almost 1½ times height of aperture plus canal. Whorls seven, including blunt, smooth typical protoconch of 2¾ whorls. Post-nuclear sculpture of strong spiral cords and numerous very oblique weak axials (20-22 per whorl) which are hardly stronger than the spirals. Cord margining upper suture moderate, becoming slightly distant from the suture on later whorls. Lower sutural cord immersed except on body-whorl. Two main spiral cords on median angulation, the uppermost forming the weak peripheral angle. Two rather strong subsidiary spirals on shoulder, and another between lower median cord and lower suture, about 21 on base, neck and weak fasciole.

Height, 12.1 mm.; diameter, 4.6 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Cliff opposite Eskdale Bridge, Petane, Hawke's Bay (Nukumaruan) Middle Pliocene. (Coll. Dr. C. R. Laws.)

Genus **Inquisitor** Hedley, 1918.

Pleurotoma awamoaensis Hutton, 1873, presents an intricate problem, for there are two forms, one with a polygyrate protoconch of 5 whorls with a minute pointed tip, the other with a paucispiral blunt protoconch of 2½ whorls, yet in shape and sculpture of the adult shell there appear to be no marked differences. True *awamoaensis* has ruder and more vertical axials, a slightly longer beak, finer and more distant main spirals on body-whorl, and a weaker sutural cord, but none of these points of difference are well marked. In the light of the basic differences indicated by diversity in the nucleus in other groups, it seems better, in spite of adult close similarities, to separate the two *"awamoaensis"* forms generically.

Suter (1914) describes the protoconch as conoid of 2½ convex whorls, and although the number of whorls is understated, the ',conoidal" shape fixes the polygyrate apiced species as true *awamoaensis*. Generically, this species is almost certainly an *Inquisitor*, the genotype of which is the Recent Queensland *Pleurotoma sterrha* Watson, described as having a protoconch "of about 2¼ very small, conically tapered embryonic whorls, parted by a very fine suture and rising to a minute rounded tip which is very much bent down on one side" (Watson 1886, p. 306). The latter remark probably refers to an individual malformation. *Crassispira* Swainson, 1840, type *Pleurotoma bottae* Valenciennes, Recent, West Mexico, is similar, except that the canal is short and the sutural fold very broad and prominent. *Clathrodrillia* Dall, 1918, type *Pleurotoma gibbosa* Reeve, Recent, Indian Ocean, is similar also, except for the heavy varix set some distance behind the aperture, a feature which connects it with "the presence of occasional varices" as ascribed to the type of *Inquisitor*. In fact, if *gibbosa*, a little known species, is found to be congeneric with *flavidulus* Lamarck (Illus. Grant & Gale 1931, pl. 26, f. 4), which has a longer canal, then, apart from the strong labial varix, there is little real difference between *Inquisitor* and *Clathrodrillia*.

Bluntly rounded axials stopped at the anal fasciole and crossed by regular spirals, together with the presence of a sutural submargining cord, represents a style of sculp-

ture which is general in the *Drillia* assemblage. It is not an impossibility therefore to get such complete resemblance in adult shell characters that even representatives of different generic lines may appear to represent but a single species. I therefore view the two contemporary *awamoaensis* forms as representing two different lines which at this one time level, the Awamoan, had their respective identities confused by close superficial similarity in all respects but that of the protoconch.

If the reference of true *awamoaensis* to the tropical Queensland genus *Inquisitor* is correct, then the arrival of the genus in New Zealand or the reverse can be explained by the presence of the "Sinusigera" apex.

On account of its blunt paucispiral protoconch, the group covering the false *awamoaensis* cannot be located in *Inquisitor*, nor is it covered by any known genus, so is accordingly here separated as a new genus, having all the essential adult features of *Inquisitor* but an atypical protoconch. There are two related Hutchinsonian species, *Inquisitor waihoraensis* Marwick, 1931, and *I. hebes* Marwick, 1931, and there remains the problematic *I. fraudator*, which, owing to the absence of the apical whorls, cannot be definitely placed in one or the other of the "*awamoaensis* groups," but from the fact that the sutural cord is weak in true *awamoaensis* and stronger in the second group, *fraudator* most likely belongs to the latter, for which I provide the new genus *Pseudoinquisitor*, with the Awamoan *problematicus* n. sp. as type.

Closely related but not identical, are a series of Upper Pliocene and Recent species typified by *Drillia maorum* Smith, 1877. These species have an apex of the same general style as in *Pseudoinquisitor problematicus*, the only difference being a strengthening of the spirals on the last half-whorl. In adult features, however, the *maorum* line differs in being of lighter build, the anal sinus is broader and shallower, and there is no trace of a parietal entering callus pad. For these species I propose a further new genus *Antimelatoma*, with *maorum* Smith as type.

Hedley's (1922, p. 250) reference of *buchanani* to *Melatoma* Swainson, 1840, raises once more the question of the status of this doubtful genus, which has been synonymised with *Clionella* Gray, 1847, by Hedley (1922, p. 249) although this association had already been rejected by Iredale (1918, p. 33). The monotype of Swainson's *Melatoma* was stated by its author to have come from Ohio, and presumably is fresh-water, and therefore non Turrid, but Dall considered that *Melatoma* equals and of course predates *Clionella*. Until the identity of the genotype can be determined, however, *Melatoma* should be rejected. *Clionella* is an African *Clavatulid* group quite unlike the New Zealand shells discussed above.

In Australia, *I. coriorudis* Hedley, 1922, from 300 fath. off Sydney and other Recent Australian species ascribed to *Inquisitor* by Hedley (1922) appear to belong to *Pseudoinquisitor*, but without examining actual material, resemblances indicated by figures and descriptions are not conclusive. A number of Hedley's (1922) placings in *Inquisitor* and *Melatoma* require redistribution.

The Australian Tertiary *Drillia oblongula* Harris, 1897 (Balcombian) and several new species (Kalimnan) seem to belong to *Pseudoinquisitor* also. Two allied new genera each with a distinctive paucispiral apex are represented by the respective species *Drillia vixumbilicata* Harris, 1897 (Balcombian) and *Drillia integra* Tenison-Woods, 1880 (Balcombian). They are here nominated and diagnosed:—

Integradrillia n. gen. Type: *Drillia integra* Tenison-Woods.

Protoconch rather bluntly conic of two smooth whorls, the initial coil lateral, terminated by a thin flexuous varix, concave above and produced forwards below. Several similar variciform threads just prior to the terminal varix, otherwise the whole protoconch is smooth and glossy. The adult sculpture commences immediately after the terminal nuclear varix, without a brephic stage. In adult characters the genus resembles *Pseudo-*

inquisitor except that there is no subsutural fold and the parietal callus pad slightly constricts the sinus, rendering it subtubular. Broadly rounded axials crossed by dense crisp spiral cords characterise the sculpture.

Vixinquisitor n. gen. Type: *Drillia vixumbilicata* Harris.

Protoconch subcylindrical of $2\frac{1}{2}$ smooth glossy whorls, first whorl bulbous, somewhat flattened above, wider and more convex than the almost straight-sided succeeding whorl, which passes abruptly into the adult sculpture, with just a few faint sinuous growth lines.

In adult features the genus differs from *Integradrillia* in having weak to subobsolete oblique axials, dense, fine spirals, a narrow subsutural margining, and a more shallow sinus less constricted by the parietal callus pad.

Genus **Inquisitor** Hedley, 1918.

Type (o.d.) : *Pleurotoma sterrha* Watson. Recent, North Queensland.

Shell slender, narrowly fusiform, with tall spire and moderately long, very weakly notched anterior canal. Sculpture of prominent long axials crossed by spiral cords. Protoconch smooth, polygyrate and narrowly conical. Sinus deep "U"-shaped, narrow, somewhat restricted by a subsutural margining cord and a parietal callus pad.

Distribution in New Zealand, (Tahuian) Upper Eocene, (Hutchinsonian) Lower Miocene and (Awamoan) Middle Miocene Recent in Australia.

Key to N.Z. Species of Inquisitor.

Axials very oblique, 13 per whorl.
- Spiral sculpture very weak .... **waihaoensis* n. sp.

Axials vertical, 10-11 per whorl.
- Spiral sculpture crisp and strong.
  - Subsutural border bearing 2 weak threads.
    - Shoulder spirals very fine .... **awamoaensis* (Hutton)
  - Subsutural border bearing 3 strong threads.
    - Shoulder spirals quite strong .... **komiticus* Laws

Inquisitor waihaoensis n. sp. Pl. 3, fig. 2.

This single large specimen, having a complete apex, and well preserved generally, except that the outer lip is broken away, is an Eocene ancestor to the well known Awamoan *awamoaensis.* It differs in having more numerous and more oblique and narrowly arched axials, 13 on penultimate, a wider shoulder, a weaker subsutural band and very weak spiral sculpture. Whorls 13, including 5 whorled, smooth, narrowly conic protoconch as in *awamoaensis.* There are about 8 indistinct very weak spiral cords below the shoulder on the spire whorls and about 37 on the body-whorl, base and neck.

Height, 33.7 mm.; diameter, 9 mm.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: McCullough's Bridge, Waihao, South Canterbury (Tahuian) Upper Eocene.

Inquisitor komiticus Laws, 1939.

1939 *Inquisitor komiticus* Laws, Trans. Roy. Soc. N.Z. 68, p. 498. Not figured.

Holotype in collection of Dr. C. R. Laws, Auckland.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Inquisitor awamoaensis (Hutton, 1873). Pl. 3, fig. 1.

1873 *Pleurotoma awamoaensis* Hutton. Cat. Tert. Moll. N.Z., p. 4.
1914 *Drillia awamoaensis* : Suter, N.Z. Geol. Surv. Pal. Bull. 2, p. 30, Pl. 2, f. 11.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: Awakino Gorge, Mahoenui beds, 1 mile west of road tunnel (Hutchinsonian) Lower Miocene; Awamoa (type); Target Gully, near Oamaru; Mt. Harris and Blue Cliffs, S. Canterbury (Awamoan) Middle Miocene.

Genus **Pseudoinquisitor** n. gen.

Type: *P. problematicus* n. sp. (Awamoan) Middle Miocene, N.Z.

The genus has all the characters of *Inquisitor* except for an atypical, paucispiral, bluntly rounded, smooth protoconch of 2½ whorls.

The definite range of the genus in New Zealand is (Hutchinsonian) Lower Miocene to (Awamoan) Middle Miocene. Possibly it extends back to the (Bortonian) Middle Eocene, that is if *fraudator* is correctly assigned. There is a Recent Australian occurrence in *coriorudis* Hedley from 300 fath. off Sydney.

Key to N.Z. Species of Pseudoinquisitor.

Shoulder smooth.
  Peripheral angle median; 4-6 spiral cords on spire whorls.
    Spire long and tapered .... **waihoraensis* (Marwick)
    Spire short and broad .... **hebes* (Marwick)
Shoulder with fine but distinct lirations.
  Peripheral angle above the middle; 4-5 spiral cords on spire whorls.
    Spire long and tapered .... **problematicus* n. sp.

Note: The Matau (Bortonian) *fraudator* is not included in the key as the type is not well enough preserved for definite generic location.

?Pseudoinquisitor fraudator (Finlay & Marwick, 1937).

1937 *Inquisitor fraudator* Finlay & Marwick. N.Z. Geol. Surv. Pal. Bull. 15, p. 114, Pl. 16, f. 3.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Castle Hill Shaft (Matau Fauna = Bortonian) Middle Eocene.

The status of the species is uncertain, as both the apical whorls and the outer-lip are unknown.

Pseudoinquisitor waihoraensis (Marwick, 1931).

1931 *Inquisitor waihoraensis* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 142, Pl. 16, f. 303.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: N.Z. G.S. locs. 1294 (type), 1328 and 1371, Gisborne, Ihungia Series (Hutchinsonian) Lower Miocene.

Pseudoinquisitor hebes (Marwick, 1931).

1931 *Inquisitor hebes* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 142, Pl. 16, f. 301.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1293, Gisborne, Ihungia Series. (Hutchinsonian) Lower Miocene.

Pseudoinquisitor problematicus n. sp. Pl. 3, fig. 3.

Shell, as already stated, almost a replica of *Inquisitor awamoaensis* except for the paucispiral protoconch. Whorls 10, including protoconch. Spire a little more than 1½ times height of aperture. Post-nuclear sculpture of prominent, broadly rounded axials, extending from shoulder angle to the lower suture, continued over base; 11 on penultimate whorl. Spiral sculpture consisting of a moderate subsutural cord, very fine lirations on the concave shoulder, and 4-5 strong but narrow rounded cords, the second from above at the angle. There are about 14 cords on the base and neck, with an occasional weak intermediate. The aperture is narrow, the canal moderately long, slightly asymmetrically notched, and the anal sinus deep, but occupying only a little more than half the width of the shoulder, it being restricted above by both the subsutural cord and the heavy parietal insertion callus. The outer lip, also, has a weak insinuation at about one third the distance from the tip of the canal to the shoulder angle.

Height, 21.8 mm.; diameter, 6.1 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Pukeuri (type) and Rifle Butts near Oamaru. (Awamoan) Middle Miocene.

Genus **Antimelatoma** n. gen.

Type: *Drillia maorum* Smith. Recent, N.Z.

Shell with a broad, rather shallow "U"-shaped sinus, no parietal entering callus pad, and a blunt paucispiral protoconch of slightly more than two whorls; first whorl smooth, dome-shaped, second with four distinct spiral cords. Anterior canal moderately long, unnotched. Outer lip without a "Stromboid"-notch. Sculpture axial and spiral.

Range, (Nukumaruan) Middle Pliocene to Recent, New Zealand.

Key to Species of Antimelatoma.

Spire whorls with 2 keels.
  Shoulder wide, steeply descending. Surface glossy .... *ahiparana* n. sp.
Spire whorls with 5-6 primary cords.
  No interstitial spirals except occasional ones on base.
    Axials nearly vertical .... *benthicola* n. sp.
  Interstitial spirals throughout.
    Axials oblique.
      Cords on spire whorls subequal. Canal long .... **buchanani* (Hutton)
      Cords on spire whorls unequal, 1 and 3 below angle stronger. Canal shorter
      maorum (Smith)

Antimelatoma buchanani (Hutton, 1873).

1873 *Pleurotoma buchanani* Hutton. Cat. Tert. Moll. N.Z., p. 4.
1893 *Pleurotoma buchanani* : Hutton. Macleay Mem. Vol. Plioc. Moll. Pl. 6, f. 26.
1914 *Drillia buchanani* : Suter, N.Z. Geol. Surv. Pal. Bull. 2, p. 29.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 2687, road bend, 108 chains at 35° from Trig. 55, Tahoraite (S.W.) S.D., Dannevirke S.D. (high in Lower Nukumaruan); N.Z. G.S. loc. 2220, Devil's Elbow, main road between head of Maipau Stream and Tararere, Arapawanui River, Block 16, Maungaharuru S.D.; Inner Harbour, Napier, sands above blue clays; Petane; middle of Newton Range (middle marl) Tutira, Hawke's Bay (Nukumaruan) Middle Pliocene; "Shakespeare Cliff" (type) = Castlecliff, Wanganui (Castlecliffian) Upper Pliocene.

Antimelatoma buchanani maorum (Smith, 1877).

1877 *Drillia ? maorum* Smith. Ann. Mag. Nat. Hist. (4), vol. 19, p. 497.
1880 *Pleurotoma buchanani* : Hutton. Man. N.Z. Moll., p. 42 (non Hutton 1873).
1905 *Surcula buchanani maorum* : Suter, Proc. Mal. Soc. 6, p. 200.
1913 *Drillia buchanani maorum* : Suter, Man. N.Z. Moll., p. 474: 1915 (Atlas of Plates), Pl. 46, f. 22.

Localities: Auckland Harbour; Tryphena Bay 5-6 fath. and Oruawharo, Great Barrier Island; Taupo Bay, Whangaroa; 25 fath. Hen and Chickens Is.; 60 fath. Poor Knights Islands.

Holotype in British Museum (Natural History).

The Pliocene *buchanani* and the Recent *maorum* Smith are very closely allied and both are subject to a considerable amount of variation in respect to the even or differential development in the spiral sculpture. In the aggregate, however, *buchanani* tends to develop 5-6 subequal cords, whereas *maorum* usually has cords 1 and 3 (downwards from angle) somewhat stronger. This does not always apply, however, but a constant difference is in the length of the canal, which is invariably shorter in the Recent species. This slight but constant difference is best expressed as subspecific only. However, there are at least two Recent benthic allies of *buchanani maorum* which rank as distinct species and are described below.

Antimelatoma benthicola n. sp. Pl. 2, fig. 10.

This species has the general proportions of *buchanani* and *maorum* except that it is narrower. Both above mentioned species have narrow primary cords with several threads in each interspace. In *benthicola* the primary cords are much thicker and heavier, and the subsidiary spirals are restricted to an occasional one, between the cords on the base only. Of the five primary cords on the spire whorls, the upper three are subequal in development, but in arrangement cords 1 and 2 are at the angle, separated only by a narrow incised line, 3 is wider spaced, as also are 4 and 5, the latter two being slightly weaker. The axials are broadly rounded folds, much nearer vertical than in *buchanani* or *maorum*. Whorls 7½, including protoconch of slightly more than two whorls, as figured for *maorum* (Text fig. C10). Axials 14 on penultimate. Shoulder devoid of spiral striae. Base with 6 primary cords, followed by three much weaker ones near the termination of the beak. No insertion callus. Outer lip not thickened, with a weak insinuation below, scarcely a notch, situated rather high up at about two fifths distance from tip of canal to shoulder angle. Sinus broad and rather deep, occupying the shoulder. Anterior canal short as in *maorum*. Colour white; *maorum* varies from light reddish-brown to chocolate.

Height, 14.4 mm.; diameter, 5 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: 50-70 fath. off Otago Heads.

Antimelatoma ahiparana n. sp. Pl. 2, fig. 11.

This distinctive species has a glossy surface, a much wider and more downward sloping shoulder, only two strong spirals on the spire whorls, no subsidiary spirals, and a long canal. Axials slightly oblique, 13 on penultimate, strongly developed only in the vicinity of the two, close spaced, peripheral cords; they do not reach the base. Basal spirals about nine, strong and wide-spaced above, but weak and indistinct towards end of beak. The uppermost basal spiral is at lower suture, and this on the spire whorls just shows as a faint supramargining of the sutures, which are also weakly and narrowly margined below. Whorls 7½, including a protoconch of slightly more than two whorls, as figured for *maorum*. Colour buff, irregularly and indistinctly streaked with pale reddish-brown.

Height, 12.7 mm.; diameter, 4.4 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.

Locality: 23 fathoms off Ahipara. Erroneously recorded from there (Powell 1927, p. 296) as *Melatoma buchanani maorum*.

Genus **Austrodrillia** Hedley, 1918.

Sub-genus **Regidrillia** n. sub-gen.

Type: *A. (R.) sola* n. sp. Recent, N.Z.

This is the nearest approach in the New Zealand fauna to the Australian Recent *Austrodrillia*. The only available specimen is from 100 fathoms off the Three Kings Islands, and although it bears close superficial resemblance to *Austrodrillia*, particularly *beraudiana*, the protoconch is discordant. That of *Austrodrillia* has two elevated smooth whorls, but in *Regidrillia* the protoconch is larger, of 2½ whorls, proportionately much broader, and weakly carinate on the last whorl, the carina commencing near the lower suture but becoming nearly central over the last half-whorl. The adult features are closely similar to those of *Austrodrillia*:—sutural submargining weak; sculpture of strong axials, obsolete on shoulder; spiral sculpture weak; very heavy entering parietal callus; sinus moderate, U-shaped, occupying lower half of shoulder, restricted above by the parietal callus; outer-lip rather thin, vertical, without a "Stromboid"-notch; anterior canal shallowly notched.

Austrodrillia (Regidrillia) sola n. sp. Pl. 10, fig. 4.

Shell of moderate size, strong, whorls 7, including a smooth conical protoconch as described above, which bears a weak carina on the last whorl. Spire one and a fifth times height of aperture plus canal. Axials very broad, strong, reaching from peripheral angle, which is just above the middle, to lower suture, and extending weakly over the base to the neck, 10 on body-whorl. Spiral sculpture of weak, low rounded cords, 5 on spire whorls from peripheral angle to lower suture, 4 on base, and 8, closer spaced on neck. The shoulder is smooth. Aperture rather narrow, sides subparallel, outer lip thin but strengthened behind by a heavy axial; no "Stromboid"-notch. Sinus U-shaped, moderately deep, occupying lower half of shoulder. Entering parietal callus heavy. Colour pale buff, protoconch and a broad basal spiral band light reddish brown. A second band of very light reddish brown occurs from below the periphery and leaves a moderate band of ground colour between it and the darker basal band.

Height, 10.3 mm.; diameter, 4.7 mm. (Holotype).

Holotype in writer's collection (Auckland Museum).
Locality: 100 fathoms off Three Kings Islands.

Genus **Tahudrillia** n. gen.

Type: *T. simplex* n. sp. (Tahuian) Upper Eocene, N.Z.

This new genus is provided for a solitary species from the New Zealand Upper Eocene (Tahuian). Just how it is related in respect to the rather numerous *Drillia*-like lines is difficult to determine, but the Recent Australian *Austrodrillia* appears to be the nearest allied genus. From *Austrodrillia* the new Eocene genus differs in having a larger and more depressed dome-shaped protoconch, weak axial sculpture and in lacking the characteristic heavy entering parietal callus pad, this being represented as a thin glaze only. The depressed dome-shaped protoconch, weak axial sculpture and obsolete spiral sculpture suggest *Splendrillia,* but the simple outer-lip profile without trace of a "Stromboid" notch, and the anterior notch in line with the axis, not slightly oblique to it, are features that are more in accord with *Austrodrillia.*

Tahudrillia simplex n. sp. Pl. 4, fig. 4.

Shell of moderate size, rather narrowly biconic, with spire almost $1\frac{1}{2}$ times height of aperture. Whorls $6\frac{1}{2}$, including smooth dome-shaped protoconch of $1\frac{1}{2}$ whorls. Body-whorl gently and regularly contracted over base. Surface smooth except for distant laterally compressed axials on the spire whorls, terminating at the shoulder as blunt nodules, eight per whorl. Nodules obsolete on body-whorl, the axials becoming weaker and closer as lines of growth. Shoulder smooth, concave, slightly angulate at the peripheral row of nodules. Sinus broad, evenly arcuate, rather deep. Anterior canal broadly and shallowly notched. Outer lip thin, not variced, evenly broadly arcuate and vertical. Parietal callus thin.

Height, 9.6 mm.; diameter, 3.5 mm.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: McCullough's Bridge, Waihao, South Canterbury (Tahuian) Upper Eocene.

Genus **Splendrillia** Hedley, 1922.

Type (o.d.): *Drillia woodsi* Beddome. Recent, S.E. Australia.

Hedley placed his *Splendrillia* as a subgenus of *Melatoma,* a name which is in dispute, and as generally interpreted is equal to the Clavatulid genus *Clionella.* *Splendrillia* can have nothing in common with *Clionella* or *Melatoma,* but is fairly close to Dall's *Cymatosyrinx,* type *Pleurotoma lunata* Lea, Miocene of Virginia, and the later proposed *Eumetadrillia* Woodring, type *Agladrillia (E.) serra,* from the Miocene of Jamaica. *Splendrillia* is characterised by having prominent axial sculpture, but with the spiral sculpture absent,

subobsolete, or as fine threads or striations. Usually the shoulder has the sinus area restricted by a strong subsutural fold, but this also may be subobsolete or absent.

The outer lip has a slight "Stromboid"-notch; there is a well developed parietal insertion callus pad; the sinus is situated on the shoulder and is rather deep, spout-like, with a thin raised rim. The protoconch is paucispiral, broad, bluntly rounded and smooth, and the operculum leaf-shaped with an apical nucleus *(debilis)*.

Cymatosyrinx need not be considered in respect to Austral shells, as the "Stromboid"-notch is very strongly developed, leaving a distinct groove cutting across the extremities of the axials on the neck, and the protoconch has the second whorl with a submedian carina. *Eumetadrillia* is much closer, the "Stromboid"-notch being weak, an insinuation only, just as in *Splendrillia*. In fact, the only apparent dissimilarity is that the protoconch is narrow in *Eumetadrillia,* but broad and dome-shaped in *Splendrillia*. The latter is represented by a compact series of Australian Recent species and a New Zealand line ranging from (Hutchinsonian) Lower Miocene to Recent.

Key to N.Z. Species of Splendrillia.

Subsutural fold present; either prominent or subobsolete. Shoulder deeply and narrowly excavated.
- Dense spiral striations over all post-nuclear whorls.
  - Subsutural fold prominent.
    - Peripheral angle well above middle.
      - Axials 11-12 per whorl .... **koruahinensis* (Bartrum & Powell)
  - Subsutural fold subobsolete.
    - Peripheral angle well above middle.
      - Axials oblique, higher than wide.
        - Axials 13-14 per whorl; shell large, body-whorl long .... **aequistriata* (Hutton)
        - Axials 15-16 per whorl, body-whorl shorter .... **annectens* n. sp.
    - Peripheral angle very low on spire to just below middle.
      - Axials 9-10 per whorl, higher than wide .... **afflicta* (Marwick)
      - Axials 10-11 per whorl, strong rounded knobs .... **clava* n. sp.
- Distant linear grooves cutting across axials.
  - Subsutural fold very prominent.
    - Axials 13 per whorl .... **powelli* (King)
- Spiral striations confined to base and neck.
  - Spire about 1.3 height of aperture.
    - Subsutural fold very prominent.
      - Axials 10 per whorl, strong, arcuate. Shell small .... **clifdenensis* n. sp.
      - Axials 14 per whorl, strong, more vertical .... *larochei* Powell
    - Subsutural fold distinct.
    - Peripheral angle just above middle.
      - Axials 12-14 per whorl, broad, not reaching base .... *aoteana* Finlay
      - Axials 9-14 per whorl, narrow, reaching base .... **filicosa* (Marwick)
    - Subsutural fold weak.
      - Axials 10-12 per whorl, reduced to oblique pointed nodules on carina ...... *debilis* Finlay
  - Spire about 1.6 height of aperture.
    - Subsutural fold weak.
      - Axials 13 per whorl .... **edita* n. sp.
- Spiral striations entirely absent, even from base and neck.
    - Subsutural fold weak.
      - Axials 10 per whorl. Shell small .... *otagoensis* n. sp.
      - Axials 8-9 per whorl. Shell large .... **lincta* n. sp.

Subsutural fold entirely absent. Shoulder deeply but broadly excavated.
- Spiral striations confined to base and neck.
  - Peripheral angle above middle.
    - Shell slender; smooth.
      - Axials 9-11 per whorl; upcurved .... **cristata* n. sp.
    - Shell broad, very finely lirate.
      - Axials 9-10 per whorl; upcurved and very massive .... **armata* n. sp.
  - Peripheral angle at middle.
    - Axials 11-12 per whorl. Shell small.................................. **anomala* n. sp.

Splendrillia filiculosa (Marwick, 1931).

1931 *Austrodrillia filiculosa* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 140, Pl. 16, f. 300.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1237, Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Splendrillia clifdenensis n. sp. Pl. 2, fig. 2.

Shell small, biconic. Spire one and a third times height of aperture plus canal. Body whorl evenly tapered over base and neck, not suddenly contracted. Whorls 6, including a typical, smooth, bluntly rounded protoconch of two whorls. Post-nuclear whorls with a strong but relatively narrow subsutural margining fold, followed by a narrow, deeply concave shoulder. Axials broadly rounded, prominent and slightly oblique, extending well over base but stopped at the sinus area above. There are ten axials on the penultimate. Surface smooth and glossy, except for about twenty very fine, indistinct threads on the lower part of the base and neck. Aperture narrowly wedge-shaped, canal rather short, with a slightly oblique, weakly notched termination. Outer lip thin, produced forwards, with a deep, broadly rounded, subsutural sinus, rendered subtubular by a heavy entering insertion callus pad.

Height, 6.8 mm.; diameter, 2.7 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (7c) Southland (Awamoan) Middle Miocene.

Splendrillia afflicta (Marwick, 1931).

1931 *Austrodrillia afflicta* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 141, Pl. 16, f. 297.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1325, Ormond Series, Gisborne (Opoitian) Lower Pliocene.

Splendrillia koruahinensis (Bartrum & Powell, 1928).

1928 *Austrodrillia koruahinensis* Bartrum & Powell. Trans. N.Z. Inst. 59, p. 150, Pl. 28, figs. 36, 37.

Holotype in Auckland University College.
Locality: Kaawa Creek, S. of Port Waikato (Opoitian) Lower Pliocene.

Splendrillia lincta n. sp. Pl. 12, fig. 1.

This is an entirely smooth surfaced member of the *afflicta-clava* group. It has the tall, narrow spire of the former, but the heavy knob-like axials of the latter. Whorls 9, including typical protoconch. Spire 1.6 times height of aperture. Peripheral angle bluntly rounded, just below middle on all spire whorls. Axials 8-9 per whorl, as prominent bluntly rounded peripheral knobs, not reaching lower suture. No spiral sculpture, not even on base or neck. Subsutural fold subobsolete. Parietal entering callus pad heavy.

Height, 17.9 mm.; diameter, 6.8 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1574, Wahanui Road, 1100-1300 paces E. of Mohaka Rd., Waiau (S.E.) S.D. (Opoitian) Lower Pliocene.

Splendrillia clava n. sp. Pl. 12, fig. 6.

Species descended from the Opoitian *afflicta;* differing in having the axials developed as prominent bluntly rounded knobs, and the peripheral angle lower especially on the early whorls. Whorls 8, including typical protoconch. Spire 1.4 times height of aperture. Peripheral angle bluntly rounded, commencing at lower fifth, but gradually gaining height until it is just below the middle on the penultimate. Axials as massive rounded knobs, 10-11 per whorl, not extending below lower suture. Whole surface with dense

spiral striae, weaker on shoulder and numbering about 12 from the periphery to the lower suture. Subsutural cord subobsolete. Parietal entering callus pad heavy.

Height, 15.8 mm.; diameter, 6.4 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 2314, near Rangitoto Junction, 2½ miles at 355° from Trig. 22, Motuotaraia (N.W.), Dannevirke S.D. (Waitotaran) Lower Pliocene.

Splendrillia powelli (King, 1933).

1933 *Awateria powelli* King, N.Z. Geol. Mem. No. 2, p. 26, Pl. 1, f. 3.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Grey Sands, Starborough Creek, Marlborough (Waitotaran) Lower Pliocene.

The strong subsutural ridge evidently influenced King in placing this species in *Awateria,* where it definitely does not belong. Actually the species is a member of the *Clavinae* and is not dissimilar to such strongly sculptured divergent members of *Splendrillia* as the Recent South Australian *Pleurotoma harpularia* Des Moulins, which was placed in *Melatoma* by Hedley 1922 (p. 251).

I have already mentioned the strong resemblance of the smoother typical Splendrillias to the Jamaican Miocene *Eumetadrillia* Woodring, 1928. Similarly, *Agladrillia,* a heavily costate and subsuturally ridged related Jamaican Miocene genus, bears a striking resemblance to *powelli* and *harpularia,* but it seems better to admit these heavily sculptured forms into *Splendrillia* than to employ an extra-limital genus purely on superficial resemblances. I have not seen specimens of the Jamaican genera with well preserved apices, but the body-whorl and apertural details are dissimilar to those of *Splendrillia* in that the sinus is more projecting and spout-like, and the base more deeply and suddenly contracted. No doubt these heavily sculptured and strongly subsuturally ridged Austroneozelanic Splendrillias merit separation, but with the material at present available this step is unwarranted.

Splendrillia aequistriata (Hutton, 1886).

1886 *Drillia aequistriata* Hutton. Trans. N.Z. Inst. 18, p. 334.
1893 *Pleurotoma aequistriata* Hutton. Macleay Mem. Vol. Plioc. Moll. Pl. 7, f. 30.

Holotype in Canterbury Museum, Christchurch.
Localities: Petane (type); Devil's Elbow, Napier-Wairoa Road; Ngaruroro River; Middle of Newton Range (upper marl) Tutira, Hawke's Bay (Nukumaruan) Middle Pliocene.

Splendrillia cristata n. sp. Pl. 12, fig. 4.

Shell of moderate size, rather slender. Spire 1½ times height of aperture. Surface smooth except for very fine dense spiral threads on the neck. Axials 9-11 per whorl, broadly rounded, prominent, and slightly upcurved above, terminating abruptly at shoulder, diminishing towards lower suture and not extending below it. Base rather deeply excavated. Parietal entering callus heavy. Aperture very wide above, resulting in a rather broader sinus than is usual in the genus. Outer lip thin, projected forwards in a broad sweep. The periphery is just above the middle, but the tops of the axials are slightly higher; not connected by a shoulder carina as in the following species.

Height, 12 mm.; diameter, 4.5 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1590, railway cutting, 55 chains N.E. of Leader Bridge, Hawkeswood (S.W.) S.D., Amuri-Kaikoura (Nukumaruan) Middle Pliocene.

Splendrillia armata n. sp. Pl. 12, fig. 2.

Shell rather large and broad, but belonging to the group of *cristata* and *parvula;* having coronated axials stopped abruptly at the shoulder and an entire absence of a subsutural fold. Peripheral shoulder well above middle, slightly carinate. Axials very strong, broadly rounded, distinctly upcurved, 9-10 per whorl, strongest at periphery, weaker at lower suture, but extending well over the base before fading out; vertical on spire-whorls, slightly oblique and flexuous on body-whorl and base. The whole of the shell is crowded with very fine close-spaced spiral threads, those on the shoulder being subobsolete.

Height, 14.75 mm.; diameter, 6 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1590, railway cutting 55 chains N.E. of Leader Bridge, Hawkeswood (S.W.) S.D., Amuri-Kaikoura (Nukumaruan) Middle Pliocene.

Splendrillia edita n. sp. Pl. 2, fig. 3.

1886 *Drillia alabaster* : Hutton. Trans. N.Z. Inst. 18, p. 351. Non Reeve, 1843.

Shell of moderate size, tall, slender, with attenuate spire 1.6 times height of aperture. Whorls 9, including typical protoconch. Shoulder deeply concave. Subsutural fold weak. Base rather quickly contracted. Axials vertical throughout, blunt, nodulous, greatly diminished at lower suture and suddenly stopped at shoulder, 13 on penultimate whorl. Spiral sculpture absent from upper whorls, but there are faint striations on the body-whorl, and a few, more distinct, on the base. Aperture typical but narrow; parietal callus pad heavy.

Height, 15.7 mm.; diameter, 5.3 mm. (estimated).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Cliff opposite Eskdale Bridge, Petane, Hawke's Bay (Nukumaruan) Middle Pliocene; near base of Castlecliff beds, Wanganui (Castlecliffian) Upper Pliocene.

Splendrillia annectens n. sp. Pl. 12, fig. 5.

Species apparently directly ancestral to the Recent *aoteana;* of similar size and proportions but differing in having the whole surface finely striated, more numerous axials, and the subsutural fold subobsolete. Whorls 8, including typical protoconch. Peripheral angle bluntly rounded, well above the middle. Axials strong, broadly rounded, slightly oblique, 15-16 per whorl. The spiral striations number about 14 from the periphery to the lower suture. Parietal callus pad heavy. All other features as in *aoteana.*

Height, 14.4 mm.; diameter, 5.6 mm. (Holotype).

Holotype in the writer's collection, Auckland Museum.

Locality: Blue clays, near base of Castlecliff beds, Wanganui (Castlecliffian) Upper Pliocene.

The species represents an evolutionary stage between the larger and more strongly striated Nukumaruan *aequistriata* and the smooth-spired Recent *aoteana.* Three species of the *aoteana* group occur at Castlecliff, and appear in the following order of frequency—*annectens* n. sp., *anomala* n. sp., and *edita* n. sp.

Splendrillia anomala n. sp. Pl. 12, fig. 3.

This little shell could easily be mistaken either for an Upper Pliocene representative of the Recent *debilis,* or a dwarf smooth form of the common Castlecliffian *annectens.* Its relationship, however, is with *cristata* n. sp., both having the subsutural fold entirely absent, the shoulder area deeply and broadly excavated, and the axials sharply planed off at the peripheral carina. Whorls 7, including typical protoconch. Periphery bluntly rounded, but rather sharply carinated at the actual shoulder, which is just above at the

middle of the whorls. On the early spire whorls both the periphery and the shoulder angle occur below the middle. Axials 11-12 per whorl, bluntly rounded, widest and strongest at the shoulder carina, where they terminate abruptly, becoming weak at lower suture and not extending below it. The axials on the body-whorl are decidedly oblique, those above being vertical. Surface smooth and glossy, devoid of spiral sculpture except for close-spaced threads on the neck and fasciole. Parietal entering callus pad heavy.

Height, 10.8 mm.; diameter, 4.4 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.

Locality: Blue clays near base of Castlecliff beds, Wanganui (Castlecliffian) Upper Pliocene.

Splendrillia aoteana Finlay, 1930.

1873 *Pleurotoma laevis* Hutton. Cat. Mar. Moll., p. 12. Non *Pl. laevis* Bellardi, 1848.

1913 *Drillia laevis* : Suter. Man. N.Z. Moll., p. 481, & 1915 (Atlas), Pl. 46, f. 26.

1930 *Splendrillia aoteana* Finlay. Trans. N.Z. Inst. 61, p. 47. Nom. nov for *Pl. laevis* Hutton, 1873.

Holotype in Dominion Museum, Wellington.

Localities: Stewart Island (type); 50 fath. off Oamaru; 50 fath. 10 miles E.N.E. Otago Heads; 40 fath. off Cuvier Island; off Great Barrier Id. in deep water; 25 fath. off Hen and Chickens Islands; 60 fath. Poor Knights Islands.

Splendrillia debilis Finlay, 1927. Pl. 2, fig. 1.

1908 *Drillia laevis parva* Suter. Proc. Malac. Soc. 8, p. 185. Non Smith 1888, non *Pl. (Drillia) parva* Tokunaga, 1906.

1913 *Drillia laevis parva* Suter: Man. N.Z. Moll., p. 481.

1927 *Splendrillia debilis* Finlay. Trans. N.Z. Inst. 57, p. 517. Nom. nov. for *Drillia laevis parva* Suter, 1908.

Holotype in Wanganui Public Museum, Wanganui.

Localities: Near Cuvier Id. in 37 fath. (type); off Little Barrier Id.; 60 fath. off Poor Knights Is.; 50 fath. E.N.E. Otago Heads; Foveaux Strait (dredged); Paterson Inlet, 13 fath. Stewart Id.

Splendrillia larochei Powell, 1940.

1940 *Splendrillia larochei* Powell. Trans. Roy. Soc. N.Z. 70, p. 243, Pl. 31, f. 8.

Holotype in writer's collection, Auckland Museum.

Localities: 140 fathoms off Three Kings Islands (type); 12 fath. off Awanui, Rangaunu Bay.

Splendrillia otagoensis n. sp. Pl. 2, fig. 4.

This is a perfect miniature of *aoteana* so far as shape and superficial appearance is concerned, but the axials are fewer; 10 on the penultimate, as compared with 12-13 in *aoteana*. The protoconch is smaller than in that species, and there is a total absence of spiral sculpture, even on the neck. The canal is short, terminating obliquely, and with a shallow notch. The outer lip, subsutural sinus, and slight "Stromboid"-notch, are all closely similar to these features in *aoteana,* and there is likewise a heavy parietal entering callus pad, which renders the sinus subtubular. Subsutural fold very weak. Colour uniformly pale buff. The species is even smaller than *debilis,* which differs in being much narrower, and has the axials reduced to pointed oblique tubercles on the carina, as well as having a larger protoconch, as in *aoteana.*

Height, 7.6 mm.; diameter, 3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: 50 fathoms off Oamaru, Otago (type); Paterson Inlet, Stewart Id., in 13 fathoms.

Genus **Syntomodrillia** Woodring, 1928.

Type (o.d.): *Drillia lissotropis* Dall, Recent, West Indies.

It is pointed out elsewhere in this bulletin that as a general rule in the *Turridae* those genera having a paucispiral protoconch are usually of local occurrence, while those with a polygyrate "Sinusigera" apex are widely distributed. There are exceptions, however, as in the case of *Micantapex,* and now in the above genus, the type of which is from the Gulf of Mexico in 220 fathoms. I have critically compared actual specimens of *Syntomodrillia iphis* Woodring, 1928, Miocene of Jamaica, *Pleurotoma sandleroides* Tenison-Woods, 1877 (Janjukian) Lower Miocene of Table Cape, Tasmania, and a New Zealand species (described below) from the (Hutchinsonian) Lower Miocene, and find a compact assemblage agreeing very closely with the original figure of the West Indian genotype.

Only one feature distinguishes the Austro-Neozelanic members, and that is the presence of a slight angulation of the base, but such a minor feature can scarcely be claimed as of any taxonomic value except in respect to a New Zealand Lower Miocene to Recent group (described below). This new group has so far diverged in sculptural plan to merit subgeneric distinction, yet clearly shows by the presence of the basal angulation that its derivation is from a local member of the *Syntomodrillia* stock.

Further new species of *Syntomodrillia* occur in Victorian Tertiary horizons.

Syntomodrillia waiauensis n. sp. Pl. 2, fig. 6.

Shell small, fusiform, spire slightly taller than aperture plus canal. Body-whorl rather suddenly contracted, causing a slight angulation high up on base, and below a rather long neck. Whorls 6½, including a globular, smooth protoconch of two whorls. Post-nuclear whorls strongly angled at the middle, and sculptured with fairly strong, rounded axials, reaching from suture to suture, and extending less strongly over the base, almost to the neck. The axials number ten on the penultimate. The surface is smooth and polished, except for about eight weak spiral threads on the neck. The aperture is narrow, produced to a rather long canal, with an oblique unnotched termination. The outer lip is thin at the edge, but is strengthened behind by a heavy rounded varix. The subsutural sinus is broad, occupying the shoulder. By the growth lines it appears shallow, but this is due to the fact that the thin extremity of the outer lip, as shown in the next species, would normally be somewhat produced, causing in effect, a much deeper sinus, as well as a weak "Stromboid"-notch below. These features are not apparent in the growth lines, as they are somewhat masked by the less flexuous trend of the axials. Parietal callus pad present but not strong.

Height, 5.5 mm.; diameter, 2.3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Clifden (6a and 6c type), Southland (Hutchinsonian) Lower Miocene.

Subgenus **Hauturua** n. subgen.

Type: *H. vivens* n. sp. Recent, N.Z.

As already stated under *Syntomodrillia,* this new subgenus differs in having a distinctive sculptural plan, apart from the presence of a basal angulation of the body-whorl, which is additional to the peripheral keel.

Obviously *Hauturua* has been derived from *Syntomodrillia,* which has a New Zealand Lower Miocene typical member in *S. waiauensis* n. sp. (described above). Whereas the axials in *Syntomodrillia* extend from suture to suture, those of *Hauturua* are absent from the shoulder area, and in several instances are reduced to pointed peripheral tubercles. There is no subsutural fold, and the protoconch is smooth and paucispiral of two whorls. The range of the genus is Lower Miocene (Hutchinsonian) to Recent, New Zealand.

Key to Species of Hauturua.

Spire 1½ times height of aperture, or less.
Axials absent from shoulder but reaching lower angulation.
Axials tubercular at both angles .... *bijuga (Marwick)
Axials produced into tubercles on upper angulation only.
Axials 11 on penultimate. Angulation median, tubercles blunt .... *exiguescens (Marwick)
Axials 12 on penultimate. Angulation at lower third, tubercles sharp ...... *laevella (Marwick)
Spire more than twice height of aperture.
Axials 10 on penultimate, very obliquely flexuous, bluntly tubercular, restricted to periphery. Angulation just below middle .... *vivens* n. sp.

Syntomodrillia (Hauturua) bijuga (Marwick, 1931).

1931 *Austrodrillia bijuga* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 141, Pl. 16, f. 298.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. locs. 1272, 1292, 1294, 1295 (type) and 1328, Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Syntomodrillia (Hauturua) exiguescens (Marwick, 1931).

1931 *Austrodrillia exiguescens* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 141, Pl. 16, f. 299.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1243, Tutamoe Series, Gisborne (Awamoan) Middle Miocene.

Syntomodrillia (Hauturua) laevella (Marwick, 1931).

1931 *Austrodrillia laevella* Marwick. N.Z. Geol. Surv. Pal. Bull. 13, p. 140, Pl. 16, f. 296.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 1292 (type) and 1293, Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Syntomodrillia (Hauturua) vivens n. sp. Pl. 2, fig. 5.

Shell of moderate size, spire tall, more than twice height of aperture plus canal. Body-whorl short, rather suddenly contracted, causing a slight basal angulation, high up. Whorls 8, including a somewhat eroded but typical globular smooth protoconch of two whorls. Post-nuclear whorls angled just below middle, and sculptured with flexuous, very oblique, broadly rounded axials, which are produced at the angulation into strong blunt tubercles. Above and below the tubercles, the axials rapidly become obsolete, not reaching either suture. The axials number ten on the penultimate. The surface is smooth except for a very few indistinct spiral threads on the neck. The aperture is narrow, with a comparatively short canal, having a very oblique unnotched termination. Outer lip thin, produced far forwards, leaving a deep rounded subsutural sinus occupying the shoulder, and with a slight "Stromboid"-notch below. Parietal entering callus strong, rendering the sinus subtubular. Colour white, shining.

Height, 9.9 mm.; diameter, 3.3 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.

Locality: 20 fathoms off Little Barrier Island.

The species has a general resemblance to *Splendrillia debilis,* but lacks the characteristic subsutural spiral fold of the typical genus, has a taller spire, and the characteristic angulate and excavated base.

Genus **Clavatoma** n. gen.

Type: *C. pulchra* n. sp. (Opoitian-Waitotaran) Lower Pliocene, N.Z.

This is a "*Crassispira*" in the broad sense, the genotype bearing a striking resemblance to such species as *Crassispira pluto* Pilsbry & Lowe, 1932, Recent from West Mexico, and *Monilispira monilis* Bartsch & Rehder, 1939, Recent, Florida. However, *Crassispira* is not

applicable, nor is *Crassispirella* Bartsch & Rehder, 1939, Recent, Lower California, as both have a heavily developed subsutural fold, which feature is subobsolete in the New Zealand fossil. *Monilispira* is nearer in sculptural plan, having a weak fold, but it, as well as the above mentioned genera, all differ in respect to the protoconch, which is paucispiral, followed by curved axial riblets, not tall, conical, of 3½ smooth whorls, as in the New Zealand genus.

Clavatoma, therefore, is defined as a nodulous sculptured *"Crassispira"* with the subsutural fold subobsolete, tall conical protoconch of 3½ smooth whorls, heavy parietal entering callus, rather deep "U"-shaped sinus, moderate oblique anterior notch, weakly defined, not ridge-margined fasciole, and a slight "Stromboid"-notch in the lower outer lip. Only one species is so far known, but it is well represented in the (Opoitian-Waitotran) Lower Pliocene of the Wairoa-Waiau subdivisions, Gisborne-Hawke's Bay.

Clavatoma pulchra n. sp. Pl. 12, fig. 8.

Shell fairly large, robust. Spire 1.3 times height of aperture. Whorls 10½, including tall, narrowly conical protoconch of 3½ smooth whorls. A broadly rounded, massive peripheral band occupies the lower half of the spire whorls and bears 10-11 stout rectangular nodules. On the upper part of the base there are two further spiral bands of similar nodules, but of diminishing size. Below these are four distant narrow spiral cords and some intermediates, the upper two weakly gemmate. Fasciole crossed by about eight weak spiral threads. The suture is submargined by a subobsolete fold. Aperture rather narrow; parietal callus-pad heavy; sinus deep "U"-shaped, on the shoulder; outer lip thin, with weak "Stromboid"-notch; anterior notch wide, moderate and oblique.

Height, 22.5 mm.; diameter, 8 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 1580, Wahanui Road, 2,400-2,600 paces east of Mohaka Road, Waiau (S.E.) S.D. (Opoitian); 1560, Waihua River, ¾ mile upstream from Ngamahanga Stream; 1568, Waihua River, 30 chains below Ngamahanga Stream (Holotype); 1559, Wahanui Road at Trig. 74, Teramarama, S.W. Wairoa S.D.; 1563, Waihua River, ½ mile below Ngamahanga Stream (Waitotaran) Lower Pliocene.

Genus **Phenatoma** Finlay, 1924.

Type (o.d.): *Pleurotoma novaezelandiae* Reeve. Pliocene-Recent, N.Z.

There is remarkable resemblance between the New Zealand *novaezelandiae* and Californian Recent species such as *"Moniliopsis" incisa ophioderma* (Dall, 1908). Fortunately Harris (1937, Pl. 12, figs. 1-4) figured the little known genotype of *Moniliopsis*, an Eocene species, *Pleurotoma elaborata* Conrad, from the Clairbornian of Alabama. This species now proves to be a near relative of *Scobinella*, although it lacks the characteristic pillar plaits. However, the protoconchs of both *Scobinella* and *Moniliopsis* are similar, the early whorls being smooth and conical, followed by a whorl, or a half-whorl, of strong axials; also the strong beaded sculpture of typical *Moniliopsis* accords well with that of *Scobinella* and its allies.

In *Phenatoma* the protoconch is small, narrow and smooth, of 3½ whorls, with a flattened planorbid tip, and without axials. Also there is a deep, narrow "U"-shaped sinus on the shoulder and a deeply notched anterior canal with a ridge-margined fasciole. The Recent Californian species, ascribed to *Moniliopsis* by Dall (1918, p. 317) have a shallower sinus, a more loosely wound protoconch of one whorl less, and no ridge margining the fasciole, but otherwise they so closely resemble *Phenatoma* that generic relationship can be scarcely doubted.

Key to Species of Phenatoma.

Spiral cords smooth. Faintly subsuturally gemmulate.
Cords unequal, medially subobsolete, 1 broad, bordering suture .... *zealandica* (Smith)
Cords evenly developed, 2 narrow bordering suture .... **precursor* n. sp.

Spiral cords gemmulate on spire; smooth on base.
Interstitial spiral threads scarcely developed.
9 primary cords below shoulder on body-whorl .... **lawsi* n. sp.

Spiral cords crossed by low axial folds.
Interstitial spiral threads numerous.
10 primary cords below shoulder on body-whorl .... *novaezelandiae* (Reeve)
Interstitial spiral threads scarcely developed.
8 primary cords below shoulder on body-whorl .... **decessor* (Marwick)
14 primary cords below shoulder on body-whorl .... **perlata* (Suter)

Phenatoma lawsi n. sp. Pl. 10, fig. 9.

Shell rather small, ancestral to *decessor* and *novaezelandiae*. Whorls more vertically compressed—body-whorl more inflated and shorter—spiral cords fewer, wider spaced and stronger. Whorls five, exclusive of the protoconch, which has the uppermost of its smooth whorls missing. Spire whorls sculptured with a heavy subsutural cord and an equally heavy one at lower third to fourth of whorl height. Equidistant on each side of this lower primary cord there is a third and fourth cord, slightly weaker, and finally a narrow thread and some weaker subsidiaries on the sinus area. On the base there are seven heavy flat-topped cords from the level of the lower suture. On the neck and fasciole there are seven much weaker and rather irregular spiral cords. Dense but fine axial growth lines render the spiral cords weakly but densely moniliform, but not below the lower primary of the body whorl. General features of aperture, sinus and anterior canal typical.

Height, 9 mm.. diameter, 4.8 mm. (Holotype).

Holotype in collection of Dr. C. R. Laws, Auckland.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Phenatoma perlata (Suter, 1917).

1917 *Bathytoma perlata* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 54, Pl. 6, f. 16.

Holotype in Otago University Museum, Dunedin.
Locality: Target Gully, Oamaru (type) (Awamoan) Middle Miocene. Two fragmentary examples from Clifden (7a) Southland (Awamoan) represent a new species with thinner, more distant basal spirals and more numerous axials, but the material is too incomplete for nomination.

Phenatoma decessor Marwick, 1928.

1928 *Phenatoma decessor* Marwick, Trans. N.Z. Inst. 58, pp. 491, 506, f. 144.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Whenuataru Peninsula and Flower Pot Harbour, Pitt Island, Chatham Islands (Opoitian) Lower Pliocene; Junction of Ruakokopatuna and Makara Streams, S. Wairarapa (Lower Nukumaruan) Middle Pliocene.

Phenatoma novaezelandiae (Reeve, 1843).

1833 *Pleurotoma rosea* Q. & G. Voy. Astrol. 2. p. 524 (non Sowerby).
1843 *Pleurotoma novaezelandiae* Reeve, Conch. Iconica, Pl. 17, fig. 143.
1843 *Pleurotoma quoyi* Deshayes, Anim. Sans. Vert. Ed. 2, 9, p. 364 (non Desmoulins).
1886 *Pleurotoma plicatella* Hutton, Trans. N.Z. Inst. 18, p. 333. (non Jan. 1832).
1913 *Drillia novaezelandiae* : Suter, Man. N.Z. Moll., p. 477 (1915 Atlas of Plates) Pl. 46, f. 23.

Holotype in British Museum (Natural History).
Localities: N.Z. G.S. loc. 1560, Waihua River, ¾ m. upstream from Ngamahanga Stream, Wairoa Subdivision; Waihi Beach, Hawera (Waitotaran) Lower Pliocene; Middle of

Newton Range, Tutira, Hawke's Bay (Nukumaruan) Middle Pliocene; Castlecliff (type of *plicatella*) and Kai Iwi, near Wanganui (Castlecliffian) Upper Pliocene. Recent "New Zealand" (type); 5-6 fath. Tryphena, Great Barrier Island; 0-3 fath. Pilot Bay, Tauranga; 23 fath. off Ahipara; 20 fath. 3 m. E. Otago Heads.

Phenatoma precursor n. sp. Pl. 10, fig. 8.

This is a Middle Pliocene offshoot from *zealandica*, differing in sculptural detail, having more evenly developed cords, not tending towards median obsolescence. There are two moderate sized subsutural spiral cords in place of the single massive subsutural cord of *zealandica*. In *zealandica* the subsutural cord causes a staged outline to the spire, but this is not a feature of *precursor*, the whorls being more evenly rounded. The spire whorls of *zealandica* have four spiral cords (1) massive, subsutural, (2) broad, the sinus rib, and (3 & 4) moderate cords below it as compared with (1 & 2) subsutural, (3) sinus rib, and (4 & 5) below it for *precursor*; all ribs being subequal and flat-topped, with narrow interspaces.

Height, 21.3 mm.; diameter, 8.3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Inner Harbour, Napier, sands above blue clays (type); Petane; N.Z. G.S. loc. 1063, Okawa shell bed, Ngaruroro River; Kereru Road, 2nd stream; N.Z. G.S. loc. 2220, Devil's Elbow, main road between head of Maipau Stream and Tararere, Arapawanui R., Block 16, Maungaharuru S.D., Hawke's Bay; N.Z. G.S. loc. 1164, Nukumaru Beach (Nukumaruan) Middle Pliocene.

Phenatoma zealandica (Smith, 1877).

1877 *Pleurotoma zealandica* Smith, Ann. Mag. Nat. Hist. Ser. 4, 19, p. 492.
1878 *Drillia cheesemani* Hutton, Journ. de Conch. 26, p. 16.
1913 *Bathytoma cheesemani* : Suter, Man. N.Z. Moll., p. 491 (1915 Atlas of Plates, Pl. 49, f. 5).

Holotype in British Museum (Natural History).

Localities: Castlecliff and Kai Iwi, near Wanganui (Castlecliffian) Upper Pliocene. Recent, between North Head and Takapuna, Auckland (type of *cheesemani*); Pilot Bay, Tauranga; 23 fath. off Ahipara; 5-6 fath. Tryphena, Great Barrier Id.; Ohiwa, Bay of Plenty; 20 fath. 3 m. E. of Otago Heads.

A few young shells from N.Z. G.S. loc. 1560, Waihua River (Waitotaran) probably representing an undescribed species, are nearer to *zealandica* than to *precursor*.

Genus **Mitrellatoma** n. gen.

Type: *Columbella angustata* Hutton, 1886 (Nukumaruan) Middle Pliocene, N.Z.

Until now Hutton's *Columbella angustata* has been known only by the badly eroded holotype. A well preserved specimen in the N.Z. Geological Survey collection shows the species to be a dwarf *Phenatoma*-like shell of the sculptural style of *precursor*, but narrower with a very shallow sinus, a very slight anterior notch and a larger but paucispiral protoconch with a bluntly rounded rather than a planorbid tip. It seems clearly to have been derived from *Phenatoma*, yet the very discordant features of the sinus, anterior notch and protoconch necessitate generic separation.

Shell small, narrowly fusiform. Spire higher than aperture. Protoconch smooth, of $2\frac{1}{4}$ whorls, nucleus off centre, the first whorl inflated and the second with straight, steep sides. Post-nuclear whorls sculptured with broad, flattened, linear-spaced spiral cords, but no axials, apart from weak growth lines. Outline of spire whorls very slightly convex, almost straight, shoulder not defined. Sinus very shallow, only half as deep as it is wide and situated between the periphery and the upper suture. Anterior canal with a broad termination quite shallowly notched. Fasciole not ridge-margined.

The genus bears superficial resemblance to some of the *Pyrenids* and also to *Mitrithara*, but its location is definitely in the *Clavinae*.

Mitrellatoma angustata (Hutton, 1886). Pl. 12, fig. 7.

1886 *Columbella angustata* Hutton, Trans. N.Z. Inst. 18, p. 333.
1915 *Alcira angustata* : Suter, N.Z. Geol. Surv. Pal. Bull. 3, p. 29.
1926 *"Columbella" angustata* : Finlay, Refd. to *Turridae*, Trans. N.Z. Inst. 57, p. 430.

Height, 10 mm.; diameter, 3.9 mm. (Holotype). Height, 10.5 mm.; diameter, 4 mm. (N.Z. G.S. loc. 2220).

Holotype in Canterbury Museum, Christchurch.
Locality: Petane (Holotype) (Nukumaruan) Middle Pliocene.

Genus **Tomopleura** Casey, 1904.

Type (o.d.): *Pleurotoma nivea* Philippi, Recent, Formosa = *Cryptomella* Finlay, 1924. Type (o.d.): *Leucosyrinx transenna* Suter (Awamoan) Middle Miocene, N.Z.

The *Drillia*-like shells with prominent spiral keels and subsidiary axial interstitial threads have been greatly confused through prejudice of their superficial similarity. The generic names involved are *Asthenotoma*, *Cryptomella*, *Drilliola*, *Filodrillia*, *Oligotoma*, *Teres*, *Teretia*, *Tomopleura* and *Turridrupa*.

In New Zealand there are two groups of these spirally keeled shells: (1) *Cryptomella* Finlay, 1924 (type the Awamoan *Leucosyrinx transenna* Suter) with a tall, narrow polygyrate protoconch of 4-5 whorls, and (2) a new genus represented by the Recent *Pleurotoma albula* Hutton and its relatives, which have a paucispiral, broad, dome-shaped protoconch of only two whorls. Finlay did not separate these groups, for he cited *transenna* as the genotype of *Cryptomella*, but diagnosed for the genus the paucispiral protoconch of *albula*. Unfortunately *Cryptomella* by its type falls as a synonym of *Tomopleura* Casey, 1904 (type the Formosan Recent *Pl. nivea* Phil.), which has a similar polygyrate apex, weak rounded sinus on the shoulder, thin outer lip, and sculpture of smooth spiral keels with dense axial growth threads in the interspaces. The only discrepancy noted is the presence of a slight fold at the base of the pillar in typical *Tomopleura*, but this is not always well developed.

A figure is provided of the operculum of an Aden example of *Oligotoma pouloensis* Jousseaume, which is undoubtedly congeneric with *nivea*. This is subovate with a blunt apical nucleus. Hedley, however, figures for *nivea* (1922, Pl. 42, f. 4) a curious operculum showing a subterminal nucleus surrounded at first by concentric growth lines, but later becoming excentric. Although I have not seen an operculum of *nivea* I can only surmise that Hedley mistook the undersurface of the operculum for the external surface, thus misconstruing the subterminal muscle scar as the nucleus. The sudden change from concentric to excentric growth does not seem natural either; and this mistake could easily have been made, as the early stages of these opercula do not show distinct growth lines.

The confused status of this group of genera is exemplified by the fact that Hedley (1922, p. 218) synonymised *Microdrillia* and *Tomopleura* under *Asthenotoma* Harris & Burrows 1891 (nom. nov. for *Oligotoma* Bellardi 1875, non Westwood 1836). Grant and Gale, 1931, placed *Tomopleura* and *Turridrupa* as synonyms of *Teres* Bucquoy, Dautzenberg & Dollfus, 1883, and treated *Asthenotoma* as a subgenus. Thiele, 1929 (p. 363), synonymised *Microdrillia* with *Asthenotoma* and cited *Drilliola* Cossmann, 1903, as a subgenus, while *Teres* (= *Teretia*) was placed as a subgenus of *Philbertia* Monterosato, 1884. *Teretia* has an unnotched anterior canal which at once removes it from the groups under discussion, *Filodrillia*, to which Hedley (1922, p. 220) referred the New Zealand Recent *albula*, belongs to the *Mangeliinae* as a near relative of *Etrema*, merely a benthic development from that genus, in which the spiral sculpture dominates the axial. Both have the characteristic subtubular sinus. *Microdrillia* and *Turridrupa*, which are discussed elsewhere in this bulletin, are more nearly allied to each other, with their strongly axially ribbed protoconchs, than they are to either *Tomopleura* or *Asthenotoma*.

Asthenotoma auct., based upon *Pleurotoma basteroti* Desmoulins, is undoubtedly identical with *Tomopleura*, but Woodring 1928, p. 197, has shown that the real genotype of *Asthenotoma* is *Pleurotoma meneghinii* Mayer = *Pl. tuberculata* Pusch., and he remarks that *basteroti* "has a different nucleus and aperture."

Unfortunately I have been unable to check this statement by the examination of material, but as all Woodring's work is extremely accurate there can be little doubt that *Asthenotoma* is generically distinct from *Tomopleura*. I have not seen *Drilliola* Cossmann, 1903 (type *D. emendata* Monterosato), but Cossmann's figure of the protoconch (1903. Ess. Pal. Comp. 5, p. 188) shows a blunt, keeled apex of 2½ whorls, quite discordant with that of any of the above discussed groups.

The status of the New Zealand Recent *albula*, with its blunt paucispiral protoconch, remains to be decided. For it I propose a new genus, *Maoritomella*. Certainly I have not satisfactorily diagnosed the problematic *Asthenotoma*, but on the other hand the two New Zealand groups with discordant protoconchs demand separation, and it seems unlikely that the revised genotype of *Asthenotoma*, which I have not seen, will prove to have affinity with the Austro-neozelanic *Maoritomella*, with its blunt paucispiral protoconch.

This assumption is based upon the observation that most of the widely distributed Turrids have a polygyrate protoconch or "*Sinusigera*" apex, which denotes an efficient free-swimming larva; while the globular, paucispiral protoconch indicates for the most part the absence of an effective larval free-swimming stage, and in consequence such species are of more or less local distribution. Thus the wide distribution of *Tomopleura* and *Microdrillia* can be readily accounted for by their "*Sinusigera*" protoconchs, and conversely it is unlikely that the paucispiral apiced Austro-neozelanic *Maoritomella* could be identical with *Asthenotoma*, the type of which is from the Miocene of Italy.

Tomopleura has an Indo-Pacific Recent range, and occurs also in the Miocene of Europe and Australia. In New Zealand the genus ranges with certainty from the (Duntroonian) Upper Oligocene to the Awamoan (Middle Miocene), but if *striatus* Marshall 1917 really belongs here also, then the genus goes back to the (Wangaloan) Upper Cretaceous.

Key to Species of Tomopleura.

Shell slender, spire about 1.3 times height of aperture. Peripheral keel sharp, projecting.
- Base with a second sub-keel emergent from lower suture.
  - Spiral keels and cords relatively narrow .... **transenna* (Suter)
  - Spirals fewer, all strong and bluntly rounded.. **finlayi* n. sp.
- Base without a second keel.
  - Spirals narrow, subequal .... **clifdenica* n. sp.

Shell wider, spire very little higher than aperture. Peripheral keel forming angle, but not strongly projecting.
- Base without a second keel.
  - Peripheral keel narrowly rounded; at 0.3 whorl height.
    - Basal spirals uneven, interspaces 1-2 times width of cords .... **excavata* (Hutton)
  - Peripheral keel very broadly rounded, at just below middle.
    - Basal spirals broad and narrow, linear spaced .... **waiauensis* n. sp.
  - Peripheral keel bluntly rounded; low down, almost at suture.
    - Basal spirals strong, even; interspaces 1-1½ times width of cords .. **crassispiralis* (Marwick)

The Waugaloan *striata* is not included in the key,as the lack of the apical whorls renders its systematic position uncertain.

Tomopleura striata (Marshall, 1917).

1917 *Turris striatus* Marshall, Trans. N.Z. Inst. 54, p. 126.
1937 *Cryptomella striata* : Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 87, Pl. 12, f. 9.

Holotype in Otago University Museum, Dunedin.
Locality: Wangaloa (Wangaloan) Upper Cretaceous.

Protoconch unknown, but the species is regarded as ancestral to the *transenna* group by Finlay & Marwick (1937, p. 87).

Tomopleura crassispiralis (Marwick, 1929).

1929 *Phenatoma (Cryptomella) crassispiralis* Marwick, Trans. N.Z. Inst. 59, pp. 924, 934, f. 75.

Holotype in Dominion Museum, Wellington.

Locality: Chatton, Southland (Duntroonian) Upper Oligocene.

Tomopleura clifdenica n. sp. Pl. 12, fig. 9.

Species ancestral to *transenna*, having the same narrow proportions, but the peripheral keel, although sharp, is not so projecting, and in position is nearer the middle. Also the base lacks the second keel, all the spiral cords, including the peripheral keel, being of approximately equal development. Suture submargined by a fine thread and a narrow cord, two narrow cords on shoulder and a further two, slightly stronger, between keel and lower suture. Below the keel on the body whorl there are about 19 narrow cords, including those on the neck. All are of approximately equal strength, but those above have interspaces of 1-1½ times their width, and those on the neck are linear spaced.

The polygyrate protoconch is particularly well preserved in the five available specimens.

Height, 10.1 mm.; diameter, 3.6 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Clifden (6c) Southland (Hutchinsonian) Lower Miocene.

Tomopleura waiauensis n. sp. Pl. 12, fig. 12.

Species related to *excavata*, but at once distinguished by the broad, flattened, smooth peripheral keel and the similarly flattened upper basal cords, which are of varying widths, but have linear interspaces. Peripheral keel situated low down on early whorls, but just below middle on later whorls. Suture submargined by a weak thread and a moderate cord. Shoulder also crossed by a weak thread followed by a moderate cord. Between the keel and the lower suture there are two cords, upper one narow, the other broad and flat. On the base there are about 10 cords, upper four linear-spaced, remainder with interspaces up to 1½ times their width. In addition, there are a number of fine threads on the neck. Fine close-spaced axial threads occupy the spiral interspaces.

Height, 8.1 mm.; diameter, 3.3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Clifden (8a type and 7c) Southland (Awamoan) Middle Miocene.

Tomopleura transenna (Suter, 1917). Pl. 12, fig. 11.

1917 *Leucosyrinx alta transenna* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 44.
1924 *Phenatoma (Cryptomella) transenna* : Finlay, Trans. N.Z. Inst. 55, p. 516.

Holotype in Wanganui Public Museum.

Localities: Oneroa, Waiheke Island; Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene. Awamoa (type): Pukeuri (Awamoan) Middle Miocene.

The Hutchinsonian records possibly represent an allied new species, but at present there is insufficient material available to determine this point with certainty.

Tomopleura finlayi n. sp. Pl. 12, fig. 10.

Species differing from *transenna* in having a much stronger subsutural cord, a very massive and strongly projecting peripheral keel and fewer and stronger basal cords. Shoulder with 2-3 very fine spiral threads; no threads or cords between keel and lower

suture, except that the lower sutural secondary keel is half emergent on the spire-whorls. Body-whorl with 13 strong cords below the keel, upper six widely spaced, interspaces once to twice their width, those on neck linear spaced.

Height, 6.5 mm.; diameter, 2.7 mm. (Holotype).

Locality: Ardgowan shell bed, near Oamaru (Awamoan) Middle Miocene.

The reduction of the spirals as well as their strengthening removes this species from suspicion as a mere extreme of the somewhat variable *transenna.*

Tomopleura excavata (Hutton, 1877).

1877 *Defranchia excavata* Hutton, Trans. N.Z. Inst. 9, p. 595, Pl. 16, f. 6.
1915 *Genota excavata* : Suter, N.Z. Geol. Surv. Pal. Bull. 3, p. 42.
1917 *Bathytoma antecostata* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 53, Pl. 6, f. 14.
1924 *Phenatoma (Cryptomella) excavata* : Finlay, Trans. N.Z. Inst. 55, p. 516.

Holotype in Otago University Museum, Dunedin.

Localities: White Rock River (type of *excavata*); Sutherlands; Target Gully; (type of *antecostata*); Ardgowan; Opihi River. (Awamoan) Middle Miocene.

Genus **Maoritomella** n. gen.

Type: *Pleurotoma albula* Hutton, Recent, N.Z.

The genus, as already differentiated under the discussion of *Tomopleura,* is strikingly similar to that genus, but discordant in having a blunt, smooth, paucispiral protoconch. The New Zealand range is (Duntroonian) Upper Oligocene to Recent, and there are at least two Recent Australian members:—*Drillia dilecta* Hedley, 1903, and *Filodrillia steira* Hedley, 1922.

Key to Species of Maoritomella.

1. Protoconch paucispiral, blunt, smooth.
   A. All keels smooth.
      (a) Subsutural cord strong, single.
         Sinus area excavated—with several spiral threads.
            Subsutural fold strong, two moderate spiral cords (or one stronger one) below a strong peripheral keel .... *albula* (Hutton)
         Sinus area with stronger spirals giving a straighter profile to spire.
            Peripheral keel low, one moderate cord and a weak thread below it .... **subalbula* (Murdoch)
      (b) Subsutural cord double. All spirals prominently raised, but narrow and sharp.
         Body-whorl truncated. Peripheral keel low—one or two spirals crowded below it .... **annosa* n. sp.
         Shell elongate, body-whorl not truncated. Peripheral keel near middle. Two closely spaced spirals below it .... **sola* n. sp.
      (c) Subsutural cord weak, to very weak.
         Two narrow but distinct spirals on sinus area, and one below the submedian keel .... **rupta* (Marwick)
         Peripheral keel submedian, very strong. Weaker cord near lower suture. A few distant strong cords on base. Spiral striae on sinus area subobsolete .. **studiosorum* (King)
   B. Peripheral keel with axial nodules or gemmules.
      (a) Subsutural cord single.
         With 13 strong rounded nodules on keel.......... **torquatella* (Marwick)
         Thin weakly tuberculate axials on keel.......... *ischna* (Watson)
         With 15 fine gemmules on keel—a second weakly gemmulate spiral below it on body-whorl .... *multiplex* (Webster)
      (b) Subsutural cord with a fine thread above it.
         Peripheral keel weakly waved by distant, oblique, weak axial folds.
            Strong submedian peripheral keel, and a moderate cord below it .... **pukeuriensis* n. sp.

2. Protoconch paucispiral, blunt, smooth, but bluntly angulate on last whorl.
    All keels smooth.
        Subsutural border broad and strong.
            Peripheral keel at lower third; with 2 spirals below it .... **pagodula* n. sp.
            Peripheral keel at lower fourth; with 1 spiral below it .... **robusta* n. sp.

Maoritomella annosa n. sp. Pl. 4, fig. 10.

Shell rather small, spire about $1\frac{1}{2}$ times height of aperture. Base short, slightly excavated below, neck obliquely twisted and somewhat truncate. Anterior canal narrow, scarcely notched. Whorls 7, including a rather large, blunt, smooth, globular protoconch of 2 whorls. Adult sculpture of spiral keels and cords and close fine interstitial axial threads, which cross the cords but do not effect the keels. On the spire whorls there is a double strong subsutural fold, the upper spiral composing it being weak; there is a single cord on the sinus area; a massive peripheral keel below the middle, and from one to two cords crowded below it. On the base there are five strong equispaced cords, and a further six on the neck. Sinus moderately deep and rather narrow, occupying the lower half of the shoulder. Outer lip slightly thickened, but not variced. The peripheral keel and cords are narrow but prominently raised.

Height, 7 mm.; diameter, 3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: N.Z. G.S. loc. 1288, greensands left bank Waitaki River, opposite Wharekuri, South Canterbury (Duntroonian) Upper Oligocene; Otiake, Waitaki Valley (Waitakian) Upper Oligocene (Holotype).

Maoritomella rupta (Marwick, 1931).

1931 *Filodrillia rupta* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 145, Pl. 15, f. 291.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1340, Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Maoritomella sola n. sp. Pl. 4, fig. 11.

Shell of moderate size, similar to *annosa,* but more fusiform, with a longer canal. Sculpture similar, except that the two spirals forming the subsutural fold are more equal in size, and the peripheral keel is not much below the middle, so that the one to two spirals below it are not so crowded. The early whorls have one spiral below the keel, but a second emerges at the penultimate. There are five spirals on the base and fifteen on the neck. Whorls 7. Details of aperture as in *annosa*, except that the anterior notch is more definite, although still very shallow.

Height, 9.1 mm.; diameter, 3.5 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.

Locality: Blue Cliffs, South Canterbury (Awamoan) Middle Miocene.

Maoritomella pukeuriensis n. sp. Pl. 4, fig. 9.

Shell of moderate size, fusiform. Spire about $1\frac{1}{4}$ times height of aperture. Whorls 7, including typical, smooth, globular protoconch of 2 whorls. Adult sculpture of spiral keels and cords. Subsutural cord strong, with a spiral thread above it. Peripheral cord below the middle, smooth, but waved by rather distant, blunt axials, confined to the peripheral zone and 10 per whorl. There is a single spiral cord below the periphery, near to the lower suture, and 1 or 2 fine threads on the sinus area. Four distant spiral cords on the base, and 16 closely spaced threads on the neck. Aperture damaged in all specimens, but indicated as typical.

Height, 9 mm.; diameter, 3.5 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Pukeuri, near Oamaru (Awamoan) Middle Miocene.

Maoritomella torquatella (Marwick, 1931).

1931 *Filodrillia torquatella* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 145, Pl. 15, f. 287.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 1325, Ormond Series, Gisborne (Opoitian); N.Z. G.S. loc. 2314, near Rangitoto Junction, 2½ miles at 355° from Trig. 22, Motu-otaraia (N.W.) S.D. Dannevirke S.D. (Waitotaran) Lower Pliocene.

The single example from loc. 2314 differs slightly from the typical species in having 15 instead of 13 nodules per whorl, and the subsutural cord is double. Further material may show it to be a directly descended new species.

Maoritomella pagodula n. sp. Pl. 13, fig. 9.

Shell of moderate size, resembling *albula* and *subalbula,* but with a more acute peripheral keel which commences on the last whorl of the protoconch. Whorls 8, including a smooth, blunt protoconch of 2¼ whorls, similar to that of the genotype except for the presence of a submedian angulation on the last whorl. Post nuclear sculpture dominated by a heavy rounded keel at the lower third, with two quite strong linear spaced cords occupying the space between it and the lower suture. Shoulder broad, fairly straight and steeply descending, bearing a distinct broad subsutural band and 4-6 fine threads on the sinus area. Base with about 10 close spaced moderately strong spiral cords which follow immediately after the two much stronger cords that lie beneath the peripheral keel. Sinus broad, but of moderate depth, "U"-shaped and occupying most of the shoulder between the subsutural band and the peripheral keel.

Height, 12 mm.; diameter, 5.6 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 2661, muddy sandstone, 95 chains at 255° from Trig. 55. Tahoraite (S.W.) S.D., Dannevirke S.D. (Holotype). N.Z. G.S. loc. 2329, 133 chains at 335° from Trig. P.I., Takapau (N.E.) S.D. Below uppermost Te Aute limestone. Dannevirke S.D. (Upper Waitotaran) Lower Pliocene. One example from locality 2329 is much narrower than the type, but is otherwise identical.

Maoritomella robusta n. sp. Pl. 13, fig. 8.

Species resembling *pagodula* in having the last whorl of the protoconch similarly but not so distinctly carinate. Post-nuclear whorls with a far more massive yet not so projecting keel, situated at the lower fourth and leaving space for only one cord beneath it. Subsutural band very wide. Sinus area sculptured with 6-10 fine spiral threads, but a much stronger one situated medially. Base with about 14 close-spaced, somewhat unequal, moderately strong cords, surmounted by two stronger cords situated immediately below the peripheral keel, the lower of these two cords being immersed over the spire whorls. The outline of the spire is rather straight. The sinus area is quite shallow and both the subsutural band and the peripheral keel are broad rather than projecting. Sinus as in last species.

Height, 15.1 mm.; diameter, 6 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 2780, Maharahara Stream, S. branch, 300 feet west of road end, Woodville (N.E.) S.D., Dannevirke S.D. (Petane beds Nukumaruan) Middle Pliocene.

Maoritomella studiosorum (King, 1933).

1933 *Filodrillia studiosorum* King, Trans. N.Z. Inst. 63, p. 350, Pl. 36, f. 9.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Cliffs east of Lake Ferry, Palliser Bay (Nukumaruan) Middle Pliocene.

Maoritomella subalbula (Murdoch, 1900).

1900 *Pleurotoma albula subalbula* Murdoch, Trans. N.Z. Inst. 32, p. 218, Pl. 20, f. 2.

Holotype in Wanganui Public Museum.
Locality: Cliffs opposite Eskdale Bridge, Petane, Hawke's Bay (Nukumaruan) Middle Pliocene; Cliffs west of Wanganui Heads (= Castlecliff) (Castlecliffian) Upper Pliocene (type).

Maoritomella albula (Hutton, 1873).

1873 *Pleurotoma albula* Hutton, Cat. Mar. Moll., p. 12.
1877 *Pleurotoma antipodum* Smith, Ann. Mag. Nat. Hist. Ser. 4, 19, p. 491.
1913 *Bathytoma albula* Suter: Man. N.Z. Moll., p. 490 (1915 Atlas of Plates), Pl. 21, f. 16.

Holotype in Dominion Museum, Wellington.
Localities: 24 fathoms, Stewart Island (type); 3-4 fathoms Motuhurakia, Noises Is., Hauraki Gulf; Cheltenham Beach and 12-13 fath. between Matiatia and Crusoe Id., Auckland; 23 fathoms off Ahipara; 38 fathoms off Cuvier Island; 5-6 fath. Tryphena, Great Barrier Id.

It is possible that two forms are covered, typical *albula* with two cords below the peripheral keel, and the other with a single stronger cord. However, as typical *albula* definitely ranges from North Auckland to the type locality, Stewart Island, the other, which is from the Great Barrier Id. in 5-6 fathoms, is unlikely to be a regional form and so is meanwhile considered as an unstable variation, pending the examination of more material.

Maoritomella ischna (Watson, 1881).

1881 *Pleurotoma ischna* Watson, Journ. Linn. Soc. 15, p. 403.
1913 *Turris ischna* : Suter, Man. N.Z. Moll., p. 470 (1915, Atlas of Plates) Pl. 21, f. 2.

Holotype in British Museum (Natural History).
Locality: East of East Cape in 700 fathoms ("Challenger").

Maoritomella multiplex (Webster, 1906).

1906 *Drillia multiplex* Webster, Trans. N.Z. Inst. 38, p. 306, Pl. 38, f. 3.
1913 *Drillia multiplex* : Suter, Man. N.Z. Moll,, p. 476.

Holotype in Dominion Museum, Wellington.
Locality: 110 fath. off Great Barrier Id.

Genus **Microdrillia** Casey, 1903.

Type (s.d. Cossmann 1906: *Pleurotoma cossmani* Meyer (= *P. meyeri* Aldrich) Upper Eocene, Mississippi. = *Acrobela* Thiele, 1925. Type (o.d.): *Bela (A.) optima* Thiele, 463 metres, East Africa.

The genotype is from the Eocene of Mississippi, but the group has a wide Tertiary and Recent distribution. It is readily recognised by the polygyrate, strongly axially ribbed protoconch, and the sinus band, which is sunken between the heavy subsutural and peripheral cords. A closely allied genus is the Tropical Queensland *Turridrupa* Hedley, 1922, (p. 226) which has a turbinate protoconch of two smooth whorls, followed by one of strong axial riblets, and a strong median cord on the sinus area. *Microdrillia* is represented in New Zealand by a solitary species from the Lower Miocene, but the Australian Recent *Drillia commentica* Hedley, 1915, *Pleurotomella fastosa* Hedley, 1907, and *Turridrupa pertinax* Hedley, 1922, as well as a new species from the Victorian Balcombian all belong to this genus. Woodring (1928, p. 197) refers *Pleurotoma (Oligotoma) patricia* Melvill, 1904, from the Persian Gulf in 156 fathoms, to *Microdrillia*, and describes a further species, *M. tersa* Woodring (1928, l.c.), from the Miocene of Jamaica. *Pleurotoma (Mangela) tiara* Watson, 1881, from 390 fathoms, West Indies, which may be a synonym of *Pl. (M.) comatotropis* Dall, 1881, is still another species.

Thiele's *Acrobela* (1925, p. 238) described as a subgenus of *Bela,* is identical with *Microdrillia,* the characteristic apex and sinus area being clearly shown in his figures of *optima* n. sp. (genotype) and *sansibarica* n. sp., both from deep water off East Africa. Thieie includes as well, *Drillia circumvertens* Melvill and Standen, 1901, from Gulf of Oman in 205 fathoms.

Microdrillia pakaurangia n. sp. Pl. 2, fig. 9.

Shell rather small, elongate biconic. Spire 1¼ times height of aperture. Whorls 9, including a tall, conical, polygyrate protoconch of 5 whorls, the tip smooth, but the remainder strongly sculptured with regular axials, at first slightly arcuate, and descending almost vertically, but at the lower third they bend abruptly forwards, and coalesce with a supra-sutural margining cord. There is a submargining cord also, and all the axial interspaces are sculptured with fine spiral striae. The termination of the protoconch is marked by a sinusigerid, prominently protractive projection and is immediately followed by the adult sculpture, of a heavy peripheral cord, subsidiary cords, and a sudden strengthening of the subsutural margining cord. Post-nuclear sculpture of prominent rounded cords and fine, crisp, axial growth lines. The spire whorls have the heavy subsutural cord, an even stronger peripheral cord below the middle, causing an angulation, followed by a slightly weaker cord, increasing to two on the antepenultimate, and three on the penultimate. There are about twenty-five cords on the body-whorl, base and neck, those below being weaker and closer spaced. The shoulder is sunken, but only lightly concave, and the sinus deep, rounded and broad. The sinus area bears close, regular, crisp, arcuate threads, marking the successive growth stages of the sinus. The outer lip is thin, arcuately protractive, but with a shallow broad insinuation at the level of the neck. The anterior canal is short, slightly constricted, and very shallowly notched. The slightly bulging fasciole causes a weak umbilical cleft.

Height, 8.75 mm.; diameter, 3.5 mm. (Holotype).

Holotype in collection of Dr. C. R. Laws, Auckland.

Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene. Two examples in Dr. Laws' collection and a half-grown one in the Dr. Finlay collection, Auckland Museum. I am indebted to Dr. Laws for permission to base the species on his almost perfect specimen.

Genus **Turridrupa** Hedley, 1922.

Type (o.d.): *Pleurotoma acutigemmata* Smith, 1877. Recent, Queensland.

The record of this tropical Indo-Pacific genus in the New Zealand Upper Miocene is based on a single badly preserved specimen. The presence of a spiral rib traversing the sinus area, the tuberculate peripheral spiral keel and evidence of axial costae on what remains of the nuclear whorls make the generic reference almost certain.

Turridrupa maoria n. sp. Pl. 11, fig. 10.

Shell small. Suture submargined by two fine threads. Sinus area traversed at about two thirds height by a sharply raised narrow cord. Peripheral keel bearing about 16 vertically compressed tubercles. Base with 14 narrow cords, those above widely spaced. The whole shell is crossed by quite strong, somewhat irregular numerous axial growth lines, rather deeply concave where they cross the sinus area.

Height, 5.3 mm.; diameter, 2.25 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1340, tuffaceous arenaceous mudstone 2000′-3000′ above the Waikokopu sandstone 0.35m. up north-flowing nameless stream from road bridge, block 12, Ngatapa S.D. (Base of Mapiri series = Taranakian) Upper Miocene.

Genus **Austroclavus** n. gen.

Type: *Drillia tenuispiralis* Marshall 1918, Hutchinsonian, Lower Miocene, N.Z.

The *Clavus* style of Turrid is widely distributed both Recent and in the Tertiary. It is readily recognised by the presence of a heavy callus pad at the top of the inner lip, and the freely projecting "Stromboid" character of the outer lip, which is indented not only by a deep rounded subsutural sinus, but also by a weaker insinuation below, towards the short, notched, anterior canal. The sculpture is simple: spirals weak or subobsolete, but with a row of strong rounded or spiny nodes at the shoulder angle.

The genotype of *Clavus* Montfort, 1810, is a West African species, *Clavus flammulatus* Montfort, 1810 (Conchyl. Syst. vol. 2, p. 434). Grant and Gale 1931 (Pl. 26, fig. 1) reproduce a good copy of Kiener's figure of the genotype. According to Hedley 1922 (p. 254) *Clavus flammulatus* Montfort 1810 = *Strombus lividus* Linn. 1758 = *Clavatula echinata* Lamarck, 1816. Hedley also states (1922, p. 255) that the protoconch of the genus is smooth and subulate and the fasciole is flat and indefinite, and the former feature at least is well shown in Grant and Gale's figure. However, Hedley's (1922, p. 255, pl. 45, f. 51) figure of the operculum of *"Clavus" vidualoides* Garrett from the Philippines as clavatulid (i.e., with a medio-lateral nucleus) does not apply to typical *Clavus,* for Garrett's species is obviously of a different genus. Grant and Gale (1931, p. 574) describe the operculum of *Clavus* as "thin, horny, usually with a terminal nucleus," but the source of their observation is not stated. Thiele (1929, p. 359) makes *Clavus* Montfort, 1810, a synonym of *Clavatula* Lamarck, 1801, but this action is not justified, as two widely sundered genera are thus united. *Clavicantha* Swainson, 1840 (type: *Pleurotoma echinata* Lamarck is an absolute synonym of *Clavus* Montfort, while *Tylotia* Melville (1917, p. 160), intended as a substitute name for *Clavus* auct., non Montfort, 1810, is based upon a peculiar Philippine shell with long curved spiny nodules, *Strombus canicularis* Bolten, 1798 (= *Pleurotoma auriculifera* Lamarck, 1822) and although the genus has been synonymised with *Clavus* by both Hedley (1922, p. 254) and Grant and Gale (1931, p. 574) it represents a distinct group now known from the West Indies also (Clench & Aguayo, 1939, pp. 195-196). *Eldridgea* Bartsch, 1934, is a synonym of *Tylotia* according to Clench & Aguayo.

Tylotia, judged by its type, is certainly not applicable to the Recent Persian Gulf species assigned to it by Melvill, neither can it be used for the New Zealand Tertiary shells described below, nor for the Australian Recent species covered by Hedley (1922, pp. 254-257). Much nearer to the New Zealand Tertiary group are several American Recent and Tertiary genera of both Dall and Woodring. *Eumetadrillia* Woodring (1928) is very similar except that the protoconch is of $1\frac{1}{2}$ smooth whorls, whereas the New Zealand group has a large tapered, conical protoconch of 4-5 smooth whorls. *Cymatosyrinx* Dall 1889 and *Agladrillia* Woodring (1928) also have a paucispiral nucleus, while in *Carinodrillia* Dall, 1919, the protoconch is of $2\frac{1}{2}$ whorls, the last $\frac{3}{4}$ whorl bearing axial riblets.

For the New Zealand Tertiary *"Clavus"*-like group and two Recent Australian deep-water relatives, the new genus *Austroclavus* is proposed. In New Zealand, the genus seems to be restricted to Hutchinsonian-Awamoan horizons (i.e., Lower and Middle Miocene). The Australian Recent members would appear to be *Melatoma lygdina* Hedley (1922, p. 252) from 150-200 fath. off Gabo Id., and *Clavus aeneus* Hedley (1922, p. 255) from 5-8 fath. Murray Id., Queensland.

Austroclavus has the apertural characters of *Clavus* auct.: "Stromboid" outer lip, deeply sinused subsuturally and insinuated below, near the canal; heavy callus-pad at top of inner lip; spiral sculpture weak or subobsolete, but strong axial tubercles at the shoulder angle. The relatively large protoconch is truly conical, straight or slightly con-

vex sided, of 4-5 smooth polished whorls, tip minutely globular, flattened down but not planorbid, somewhat excentric, ending abruptly in a weak "Sinusigera" varix: there is no brephic sculpture.

Key to Species of Austroclavus.

A. Protoconch of 5 whorls, with suture narrowly margined above.
  Shell smooth except for spirals on neck of canal.
    Axials moderately broad but compressed to narrow crest, 10 on penultimate.
      Shoulder at three-fifths whorl height .... **nitens* (Marshall)
    Axials narrow, 11 on penultimate.
      Shoulder at three-fourths whorl height................................ **kaipara* (Laws)
    Axials broad above, spinose at keel, rapidly diminished and flexed below, 11 on penultimate .... **clifdenensis* n. sp.
    Axials broad and strong to lower suture.
      10 on penultimate. Shell wide .... **marshalli* n. sp.
      9 on penultimate. Shell narrow .... **awakinoensis* n. sp.

B. Protoconch of 4 whorls, with unmargined sutures.
  Spiral sculpture not limited to neck of canal.
    Weak spirals, well developed over whole of body-whorl, numerous hair-like spirals on shoulder .... **tenuispiralis* (Marshall)
    Spirals indicated only by faint markings on body-whorl, shoulder almost smooth; tubercles strongly spinose .... **finlayi* n. sp.

Austroclavus tenuispiralis (Marshall, 1918).

1918 *Drillia tenuispiralis* Marshall, Trans. N.Z. Inst. 50, p. 269, Pl. 19, figs. 11, 16.

Holotype in Wanganui Public Museum.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Austroclavus nitens (Marshall, 1918).

1918 *Surcula nitens* Marshall, Trans. N.Z. Inst. 50, p. 267, Pl. 19, figs. 3, 15.

Holotype in Wanganui Public Museum.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Austroclavus kaipara (Laws, 1939).

1939 *Clavus kaipara* Laws, Trans. Roy. Soc. N.Z. 68, p. 500, Pl. 65, f. 47.

Holotype in collection of Dr. C. R. Laws, Auckland.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Austroclavus finlayi n. sp. Pl. 1, fig. 3.

Shell rather small, narrowly fusiform. Spire almost $1\frac{1}{2}$ times height of aperture. Whorls sharply angled just below middle, 9, including a 4-whorled, smooth, glossy, sinusigerid, narrowly-conic protoconch. Shoulder deeply concave. Post-nuclear whorls sculptured with prominent, spinose, tubercular axials stopped at angle, and greatly reduced to almost obsolete at lower suture, 10 on penultimate. Surface smooth and glossy, except for about 20 spiral threads on fasciole, neck and lower part of base, strongest on fasciole and fading out on base. Aperture broken in all available specimens, but evidently quite typical. Parietal insertion callus well developed.

Height, 8.1 mm.; diameter, 3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (6c) Southland (Hutchinsonian) Lower Miocene.

Austroclavus clifdenensis n. sp. Pl. 1, fig. 1.

Shell rather small, similar to *finlayi,* but with a protoconch of the first group, almost identical with that of the second group, but with 5 whorls and the sutures narrowly margined above. Whorls sharply angled at middle, 10, including protoconch. Axials

strong, spinose, tubercular as is *finlayi,* but more oblique, 10 on penultimate. Surface smooth and glossy except for 8 distinct spiral cords on neck of canal. Spire 1½ times height of aperture. Aperture typical. Parietal insertion callus massive. Examples from Clifden (4b), a lower horizon than (6c), show very slight differences in the axials being slightly more oblique, and the body whorl a trifle narrower, but these differences are too slight even for subspecific differentiation.

Height, 8.4 mm.; diameter, 3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Clifden (6c type and 4b) and (East side A), Southland (Hutchinsonian) Lower Miocene.

Austroclavus awakinoensis n. sp. Pl. 1, fig. 4.

Shell small, protoconch of 5 whorls, as in second group, with suture lightly margined above. Whorls 8, including protoconch, angled at middle, shoulder deeply concave. Spire 1½ times height of aperture. Axials broad and strong, bluntly tubercular at angle, but not spinose, 9 on penultimate, reaching lower suture, but absent from base. Surface smooth and glossy except for 8 fine spiral threads on neck of canal. Aperture typical (broken in holotype). Parietal insertion callus strong.

Height, 6.5 mm.; diameter, 2.4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Awakino Gorge, 1 mile W. of road tunnel at N. entrance to Gorge, Mahoenui Beds (Hutchinsonian) Lower Miocene.

Austroclavus marshalli n. sp. Pl. 1, fig. 2.

Species the direct descendant of *clifdenensis,* differing in being proportionately wider, shoulder not so deeply concave, and the axials wider, heavier, and broader; bluntly tubercular at the angle, but not spinose. Whorls 9, including 5 whorled first group protoconch. Axials 10 on penultimate, more strongly developed on body-whorl than in *clifdenensis.* Shell smooth and glossy, except for 8 spiral cords on neck of canal.

Height, 9 mm.; diameter, 3.1 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Pukeuri (type); Target Gully and Ardgowan, near Oamaru (Awamoan).

BORSONIINAE.

Genus **Borsonia** Bellardi, 1839.

Type (monotypy): *B. prima* Bellardi (Helvetian) Miocene, Turin, Italy.

Finlay (1930, p. 81) reviewed the New Zealand Tertiary members of this genus and the closely allied *Cordieria,* both of which bear two columellar plaits. The genotype of *Borsonia* has only one plait, but Cossmann (1896, pp. 96-98) allows the genus to cover species with one or two plaits. In the New Zealand Eocene there are two characteristic groups—*"Borsonia"* of Turriculid style, with long canal and rather deep sinus, and *"Cordieria"* for Mitromorphoid shells with short canal and a wide shallow sinus.

The range of *Borsonia* in New Zealand is (Bortonian) Middle Eocene to (Hutchinsonian) Lower Miocene. Cossmann (l.c.) cites a European range for the genus of from Palaeocene to Pliocene, and mentions Recent occurrences off the Azores and Philippines.

Key to N.Z. Species of Borsonia.

Axials 6-7 per whorl, interspaces wider .... **zelandica* (Marshall)
Axials 9-10 per whorl, interspaces subequal.
  Shell over 15 mm. Axials knobby .... **mitromorphoides* Suter
  Shell under 10 mm. Axials longer, rib-like .... **clifdenensis* Finlay

Borsonia zelandica (Marshall, 1919).

1919 *Volutoderma zelandica* Marshall, Trans. N.Z. Inst. 51, p. 230, Pl. 17, f. 4, 5.
1930 *Borsonia zelandica* : Finlay, Trans. N.Z. Inst. 61, p. 82.

Holotype in Wanganui Public Museum.
Locality: Hampden, North Otago (Bortonian) Middle Eocene.

Borsonia mitromorphoides Suter, 1917.

1917 *Borsonia (Cordieria) mitromorphoides* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 59, Pl. 12, f. 22.
1930 *Borsonia mitromorphoides* : Finlay, Trans. N.Z. Inst. 61, p. 82.

Holotype in Otago University Museum, Dunedin.
Locality: Wharekuri, Waitaki Valley (Duntroonian) Upper Oligocene.

Borsonia clifdenensis Finlay, 1930. Pl. 4, fig. 2.

1930 *Borsonia clifdenensis* Finlay, Trans. N.Z. Inst. 61, p. 82.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (6c), Southland (Hutchinsonian) Lower Miocene.

Genus **Cordieria** Rouault, 1848.

Type (s.d. Cossmann, 1896, p. 98): *C. iberica* Rouault. Eocene, Paris Basin.

The genus, according to Cossmann (1896, p. 100) has a European range of from Eocene to Pliocene. In New Zealand the genus is known only from the (Tahuian) Upper Eocene.

Key to N.Z. Species of Cordieria.

Shell rather slender; spirals thin.
Axials 9 per whorl .... **huttoni* Finlay

Shell stout, rather squat; spirals thick.
Axials 6-7 per whorl; very stout and knobby .... **verrucosa* Finlay
Axials 9 per whorl, stout .... **rudis* Hutton
Axials 10-12 per whorl .... **haasti* Finlay

Cordieria rudis (Hutton, 1885).

1885 *Clathurella rudis* Hutton, Trans. N.Z. Inst. 17, p. 328.
1930 *Cordieria rudis* : Finlay, Trans. N.Z. Inst. 61, p. 82, Pl. 4, figs. 47-50.

Holotype in Canterbury Museum, Christchurch.
Locality: McCullough's Bridge, S. Canterbury (Tahuian) Upper Eocene.

Cordieria haasti Finlay, 1930.

1930 *Cordieria haasti* Finlay, Trans. N.Z. Inst. 61, p. 83, Pl. 4, figs. 57, 58, 59.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: McCullough's Bridge (Tahuian) Upper Eocene.

Cordieria verrucosa Finlay, 1930.

1930 *Cordieria verrucosa* Finlay, Trans. N.Z. Inst. 61, p. 83, Pl. 4, figs. 60, 61.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: McCullough's Bridge (Tahuian) Upper Eocene.

Cordieria huttoni Finlay, 1930.

1930 *Cordieria huttoni* Finlay, Trans. N.Z. Inst. 61, p. 84, Pl. 4, figs. 52-55.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: McCullough's Bridge (Tahuian) Upper Eocene.

Genus **Borsonella** Dall, 1908.

Type (o.d.): *Borsonia dalli* Arnold. Pliocene-Recent, California.

The genus is typically of West American Pliocene to Recent distribution, and is characterised by the possession of a single strong pillar plait and a deep sinus on an excavated shoulder. The sculpture is normally spiral, feeble, but with one or two spiral carinae; axials when present are associated with the peripheral keel.

The New Zealand (Urenuian) Upper Miocene species assigned to the genus by Marwick (1931, p. 137) has stronger axials than in any West American species, but otherwise seems fairly well placed.

Borsonella sinelirata Marwick, 1931.

1931 *Borsonella sinelirata* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 137, Pl. 15, f. 289.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Ormond Series, N.Z. G.S. loc. 1332, Gisborne (Urenuian) Upper Miocene.

Genus **Eoscobinella** n. gen.

Type: *E. tahuia* n. sp. (Tahuian) Upper Eocene, N.Z.

This new genus, at present represented only by a solitary specimen from the New Zealand Upper Eocene, is allied to the North American Oligocene *Scobinella*, but so distinct from it in details of protoconch, sculpture and form of the pillar plaits that generic separation is essential. Shell very narrowly fusiform, like a *Zexilia*, but at once distinguished by the deep *Zemacies*-like shoulder sinus. Protoconch imperfect but indicated as tall, conical and polygyrate of about five whorls, followed by a half-whorl of strong brephic axials. The post-nuclear sculpture is of moderately strong, slightly oblique, broadly rounded axials, crossed by weakly incised linear grooves. The pillar bears a number of weak oblique narrow plaits. *Scobinella* has a low conic protoconch of $2\frac{1}{2}$ whorls, strong beaded adult sculpture, and distinct *Mitra*-like folds on the pillar.

Eoscobinella tahuia n. sp. Pl. 4, fig. 1.

Shell of moderate size, elongate-fusiform. Whorls about 11, including a tall polygyrate, smooth protoconch of about five whorls as described above. Suture margined by a distinct rounded cord, shoulder concave, distinct. Axials broadly rounded, oblique, about 16 on spire whorls, becoming obsolete on latter half of body-whorl. The axials are stopped at the shoulder angle, and on the spire whorls are crossed by nine weakly incised linear spirals. On the latter half of the base both axials and spirals are obsolescent. Aperture narrow, elongate, broken in only known specimen. Pillar vertical, bearing about 7 weak oblique plaits. Outer lip, as shown by growth lines, with a deep rounded sinus, occupying the shoulder; below the thin lip swings forward in a broad arc.

Height, 17.4 mm.; diameter, 4.5 mm.

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: McCullough's Bridge, South Canterbury (Tahuian) Upper Eocene.

Genus **Mitrithara** Hedley, 1922.

Type (o.d.): *Columbella alba* Petterd (Recent) Tasmania.

Small solid biconical to cylindro-fusiform shells with a blunt, smooth, paucispiral protoconch; one or two indistinct plications on the columella, anterior canal short and wide, sinus broad and very shallow. Sculpture of close revolving cords sometimes crossed by axial riblets; whorls never shouldered. Outer-lip unvariced, typically lirate within. The genotype is Recent Tasmanian and Southern Australian, but the genus has a representative in the Australian Tertiary in the Balcombian *daphnelloides* (Ten.-Woods). In New Zealand the range of the genus is Waitakian (Upper Oligocene) to Recent.

Key to Species of Mitrithara.

1. Axials persistent over all post-nuclear whorls; rendering spirals granulate or gemmulate.
   - Axial threads very numerous, about 30 per whorl.
     - Spiral cords 7 on spire whorls .... *granulifera* Powell
   - Axials and spirals latticed, forming rectangular interspaces. Axials arcuate, 18-19 per whorl.
     - Spiral cords 4-5 on spire whorls .... *barrierensis* n. sp.
   - Axials stronger, vertical, 15-16 per whorl.
     - Spiral cords 4-5 on spire whorls .... *gemmata* (Suter)
   - Axials fewer, quite strong, 10-13 per whorl.
     - Spiral cords 5-6 on spire whorls .... **formosa* Marwick
2. Axials obsolete from body-whorl; gemmulate only on upper whorls.
   - Axials 15 per whorl.
     - Spiral cords 4-6 on spire whorls .... **brachyspira* (Suter)
   - Axials 20 per whorl.
     - Spiral cords 6 on spire whorls .... **granum* Marwick
3. Axials absent from all whorls.
   - Shell narrowly ovate.
     - Spiral cords 7-9 on spire whorls .... **sutherlandica* n. sp.
   - Shell ovate-biconic.
     - Spiral cords 7-8 on spire whorls .... **waitakiensis* n. sp.

Mitrithara waitakiensis n. sp. Pl. 11, fig. 13.

Shell ovate-biconic; spire whorls lightly and evenly convex. Sculpture of moderately strong flattened spiral cords with narrower interspaces; 7-8 cords on spire whorls and 26 on body-whorl. A few faint axial threads cross the early spire whorls, otherwise the cords are quite smooth. There are two quite strong pillar plaits.

Height, 9 mm.; diameter, 3.5 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Otiake, Waitaki Valley (Waitakian) Upper Oligocene.

Mitrithara sutherlandica n. sp. Pl. 4, fig. 5.

Shell small, slender, narrowly ovate, sculptured with close-spaced, prominent, rounded spiral cords. Whorls 5½, including typical paucispiral blunt protoconch. (Apical whorls badly eroded in all available material.) Spire same height as aperture. Whorl outlines very slightly convex. Seven to nine spirals on spire whorls, nineteen on body-whorl and base, with a further series of finer, and closer spaced, spiral cords on the neck and fasciole. Axials entirely absent. Outer lip much thickened within. Sinus broad and shallow, but distinct.

Height, 6 mm.; diameter, 2.1 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Sutherland's, South Canterbury (Awamoan) Middle Miocene.

Mitrithara brachyspira (Suter, 1917).

1917 *Borsonia (Mitromorpha) brachyspira* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 58, Pl. 6, f. 20.

Holotype in Otago University Museum, Dunedin.

Locality: Target Gully, Oamaru (Awamoan) Middle Miocene.

Mitrithara granum Marwick, 1928.

1928 *Mitrithara granum* Marwick, Trans. N.Z. Inst. 58, p. 490, fig. 138 on p. 506.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Whenuataru Peninsula, Chatham Islands (Opoitian) Lower Pliocene.

Mitrithara formosa Marwick, 1931.

1931 *Mitrithara formosa* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 146, Pl. 16, f. 307.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1325, Ormond Series, Gisborne (Opoitian) Lower Pliocene.

Mitrithara gemmata (Suter, 1908).

1908 *Mitromorpha gemmata* Suter, Proc. Malac. Soc. 8, p. 186, Pl. 7, f. 18.

Holotype in Wanganui Public Museum.

Localities: 50 fathoms, Snares Islands (type); 60 fathoms off Otago Heads; 50 fathoms off Oamaru.

Mitrithara barrierensis n. sp. Pl. 11, fig. 12.

This is a northern relative of the Forsterian-Rossian *gemmata,* differing in sculptural detail. *Gemmata* has close-spaced spirals developed into prominent transversely oval gemmules, spreading across broadly rounded axials, but in *barrierensis* the sculpture is latticed by more distant spirals and narrower, flatter axials enclosing rectangular interspaces. Also the axials are decidedly arcuate on the body-whorl in *barrierensis* and there is a broader concavity between the subsutural cord and the next below. In *gemmata* the axials are more vertical and the subsutural sulcus is no wider than the other interspaces. Spiral cords 4-5 on spire whorls, 18 on body-whorl. Axials 18-19 per whorl. There are two weak pillar plications.

Height, 7 mm.; diameter, 3 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.

Locality: Off Little Barrier Island in 20 fathoms.

Mitrithara granulifera Powell, 1937.

1937 *Mitrithara granulifera* Powell, Discovery Reports, 15, p. 218, Pl. 56, f. 9.

Holotype in British Museum (Natural History).

Locality: Discovery II., Station 933, 260 metres off Three Kings Islands.

Genus **Itia** Marwick, 1931.

Type (o.d.): *Itia clatrata* Marwick (Hutchinsonian) Lower Miocene, N.Z.

This genus was proposed with a brief diagnosis for a Gisborne Ihungian (Lower Miocene) fossil, stress being placed on the "large protoconch with its depressed apex and the peculiar trellised sculpture of the body-whorl." No attempt at generic corellation was made. Examination of the type material shows that a better manner of description of the sculpture would be—whorls sculptured with numerous rounded, close-spaced axials, the whole being cut by deeply incised linear grooves. Closely similar sculpture is characteristic of my *Mitrithara regis* Powell (1937, p. 218, Pl. 56, f. 10), and undoubtedly the two are related. The Recent *regis* has a large, smooth, dome-shaped protoconch also, and is followed similarly by a half whorl of brephic axials. Also the recent shell bears two rudimentary columellar plaits. The protoconch of true *Mitrithara* is much smaller and narrower, and lacks the brephic stage, so *Itia* may be preserved as a near relative of *Mitrithara.*

Itia clatrata Marwick, 1931.

1931 *Itia clatrata* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 143, Pl. 12, f. 230.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1340, Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Itia regis (Powell, 1937).

1937 *Mitrithara regis* Powell, Discovery Reports, 15, p. 218, Pl. 56, f. 10.

Holotype in British Museum (Natural History).

Localities: Discovery II., Station 933, 260 metres off Three Kings Islands; 60 fathoms off Poor Knights Islands.

Genus **Vexithara** Finlay, 1926.

Type (o.d.): *Antimitra vexilliformis* Marshall & Murdoch (Awamoan) Middle Miocene, N.Z.

A New Zealand Miocene group closely allied to *Mitrithara*. Typically, *Mitrithara* has only spiral sculpture but weak axial reticulation and in extreme forms quite strong axials may be present. *Vexithara* differs in being prominently shouldered with a strong spiral keel at the peripheral angle. Weaker, close-spaced spiral cords and regular axials complete the post-nuclear sculpture. Protoconch narrow, erect, of two smooth whorls—narrower and more peg-like than in *Mitrithara*. Sinus very shallow, occupying the shoulder. Two weak but distinct columellar plaits. The two known species are of elongate sub-cylindrical outline.

Vexithara vexilliformis (Marshall & Murdoch, 1923).

1923 *Antimitra vexilliformis* Marshall & Murdoch, Trans. N.Z. Inst. 54, p. 127, Pl. 13, f. 3.
1926 *Vexithara vexilliformis* : Finlay, Trans. N.Z. Inst. 56, p. 254.

Holotype in Wanganui Public Museum.

Locality: Pukeuri, near Oamaru (Awamoan) Middle Miocene.

Vexithara nodosolirata (Suter, 1917).

1917 *Ptychatractus nodosoliratus* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 25, Pl. 12, f. 23.
1926 *Vexithara nodosolirata* : Finlay, Trans. N.Z. Inst. 56, p. 254.

Holotype in Canterbury Museum, Christchurch.

Localities: Blue Cliffs (type); Pareora River, S. Canterbury (Awamoan) Middle Miocene.

Genus **Maorimorpha** Powell, 1939.

Type (o.d.): *Mitromorpha suteri* Murdoch, 1905. Recent, N.Z.

In 1939 (Rec. Auck. Inst. Mus. 2, p. 235) I proposed the above generic name for the problematic *suteri*, originally described from Whangaroa Harbour (C. Traill collection). The species has since turned up from Bluff oyster scrapings and in 10-17 fathoms off Half Moon Bay, Stewart Island. Traill collected at both Whangaroa and Stewart Island and there is the possibility that his collections of small material became mixed. Certainly he was responsible for the erroneous record of some Australian molluscs in the New Zealand fauna. It is possible, therefore, that *M. suteri* may be found to be restricted to the Forsterian in New Zealand, and this remark may apply also to the Liotid species *Conjectura glabella* (Murdoch, 1905) described from "Whangaroa Harbour (C. Traill collection)". A second Forsterian species of *Maorimorpha* is described below.

The genus seems allied to *Mitrithara*, but is much more slender, has a characteristic few-whorled smooth protoconch of 1½ whorls, the tip set askew and inrolled, and no columellar plicae. The genus has a close superficial resemblance to the Pyrenid genus *Paxula*, except that *Maorimorpha* has a shallow but nevertheless distinct shoulder sinus.

Some of Verco's South Australian *Mitromorpha* spp. (= *Mitrithara*) resemble *Maorimorpha* in shape, and some likewise by the absence of columellar plicae, but in none is the characteristic *Maorimorpha* protoconch present.

Maorimorpha suteri (Murdoch, 1905).

1905 *Mitromorpha suteri* Murdoch, Trans. N.Z. Inst. 37, p. 220, Pl. 7, f. 6.
1913 *Alcira suteri* : Suter, Man. N.Z. Moll., p 440.
1926 *"Mitromorpha" suteri* : Finlay, Trans. N Z. Inst. 57, p. 430.
1939 *Maorimorpha suteri* : Powell, Rec. Auck. Inst. Mus. 2, p. 235.

Holotype in Dominion Museum, Wellington.

Localities: Whangaroa Harbour (C. Traill) (Type, but locality here considered doubtful); Bluff, oyster scrapings; 10-17 fath. off Fancy Group, Stewart Island; Foveaux Strait (dredged, A. Hamilton collection).

Maorimorpha secunda n. sp. Pl. 5, fig. 1.

Differs from *suteri* in being more narrowly ovate-fusiform, with proportionately longer spire, and higher, more loosely coiled whorls. Style of protoconch, aperture and sculpture almost identical, but the colour is uniformly dull-white, except the protoconch, which is buff to pale grey . Although the spiral element in the sculpture is similar, 6-7 cords on spire whorls, and 16-20 on the body-whorl, the axials are more distant and stronger, causing weak reticulation. Sinus broad and shallow, occupying the broad, ill defined shoulder, and more definite than in *suteri*.

Height, 4.6 mm.; diameter, 1.7 mm. (Holotype).

Holotype in Auckland Museum (Dr. C. R. Laws collection).

Locality: 72 fathoms off Cape Saunders, Otago.

Genus **Scrinium** Hedley, 1922.

Type (o.d.): *Mitromorpha brazieri* Smith. Recent, New South Wales.

A genus of small ovate to ovate-biconic Turrids with a low, dome-shaped, smooth, paucispiral protoconch, wide aperture and very shallow subsutural sinus, very short wide canal and twisted columella. A noticeable feature is that the sinus area is weakly defined or undifferentiated. The genus ranges from the (Duntroonian) Upper Oligocene to Recent in New Zealand. Apart from the genotype three other Recent species are known from Southern Australia, and it is represented in the Australian Tertiary by the (Balcombian) *Columbella hemiothone* Tenison-Woods, 1880.

Key to N.Z. Species of Scrinium.

1. Spire short. Shell ovate, very inflated.
   - A. Shoulder undifferentiated.
     - Surface with very weak spirals.
       - Axials 9 per whorl, broad, low and indistinct, absent from body whorl **ordinatum* (Hutton)
2. Spire equal to or slightly higher than aperture. Shell elongate-oval or ovate-biconic.
   - B. Shoulder bluntly rounded.
     - Surface with subobsolete spiral threads.
       - Axials 8-9 per whorl, low, broadly rounded .... **blandiatum* (Suter)
     - Surface with numerous fine threads and wider spaced basal cords.
       - Shell broadly ovate.
         - Axials 10 per whorl .... **stirophorum* (Suter)
       - Shell narrowly ovate.
         - Axials 11-12 per whorl .... **finlayi* n. sp.
     - Surface evenly sculptured with numerous fine linear spaced threads.
       - Axials 8 per whorl, broadly rounded, prominent .... **callimorphum* (Suter)
     - Surface with numerous fine spiral threads, but several at periphery more strongly developed ....
       - Axials 10-11 per whorl, ovate, strongly nodulous .... **thomsoni* n. sp.
       - Axials 14 per whorl, broadly rounded .... **strongi* Marwick

C. Shoulder angled.

Surface with broad, flat, linear-spaced spirals.

Axials 8 per whorl, broad, low, and indistinct.

Shoulder buff, reddish-brown below.............................. *neozelanicum* (Suter)

Axials 14-15 per whorl, broad and low.

Shoulder dark purplish-brown, buff below .... *sandersonae* (Bucknill)

Scrinium callimorphum (Suter, 1917).

1917 *Euthria callimorpha* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 31, Pl. 12, f. 6.

Holotype in Otago University Museum, Dunedin.
Locality: Waitaki Valley, opposite Wharekuri (Duntroonian) Upper Oligocene.

Scrinium blandiatum (Suter, 1917).

1917 *Mangilia blandiata* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 55, Pl. 12, f. 17.

Holotype in Wanganui Public Museum.
Locality: Otiake, Waitaki Valley (Waitakian) Upper Oligocene.

Scrinium ordinatum (Hutton, 1877).

1877 *Cominella ordinatis* Hutton, Trans. N.Z. Inst. 9, p. 596, Pl. 16, f. 8.

Holotype in Otago University Museum, Dunedin.
Localities: White Rock River, South Canterbury; Target Gully, Oamaru (Awamoan) Middle Miocene.

Scrinium stirophorum (Suter, 1917).

1917 *Euthria stirophora* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 32, Pl. 4, f. 16.

Holotype in Otago University Museum, Dunedin.
Locality: Target Gully, Oamaru (Awamoan) Middle Miocene.

Scrinium finlayi n. sp. Pl. 11, fig. 9.

Shell small, narrowly ovate, spire one and a third times height of aperture. Protoconch blunt, dome-shaped, of two smooth whorls followed by a few brephic axials. Surface of post-nuclear whorls with subobsolete fine spiral threads and strong, wide-spaced basal cords. Axials vertical, bluntly rounded, 11 to 12 per whorl, weaker on body-whorl but continuing well over base and rendering the five widespaced spirals weakly gemmulate at the points of intersection. The shoulder is shallowly concave commencing at three-fourths whorl height.

Height, 7 mm.; diameter, 2.75 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality :Target Gully, Oamaru (Awamoan) Middle Miocene.

The species is nearest to *stirophorum*, which is larger, much broader and with stronger subsidiary spirals, particularly on the spire whorls, as well as a wider shoulder.

Scrinium strongi Marwick, 1931.

1931 *Scrinium strongi* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 137, Pl. 15, f. 288.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: N.Z. G.S. locs. Tutamoe Series (Upper) 1733 ?, 1765 (Awamoan) Middle Miocene; Ormond Series, 1322 (type) Gisborne (Urenuian) Upper Miocene.

Scrinium thomsoni n. sp. Pl. 11, fig. 8.

Shell large for the genus, broadly ovate-biconic, with spire equal to height of aperture. Sculpture of prominent blunt ovate nodules occupying the lower half of the spire whorls and not extending over the base. Spiral sculpture consisting of about ten very fine

threads on the shoulder, four strong narrowly rounded cords at the periphery, accentuated on the axials, and a number of unevenly developed threads on the body-whorl as well as two moderate cords about the middle of the base.

Height, 15 mm.; diameter, 7.5 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Lower end of Starborough Creek, Marlborough (Waitotaran) Lower Pliocene. Collected by the late Dr. J. Allan Thomson, 1914.

Scrinium neozelanicum (Suter, 1908).

1908 *Bela neozelanica* Suter, Proc. Malac. Soc. 8, p. 185, Pl. 7, f. 17.

Holotype in Wanganui Public Museum.
Localities: 3-4 fathoms Whangarei Heads (type); 25 fathoms Hen and Chickens Islands; 60 fathoms Poor Knights Is.

Scrinium sandersonae Bucknill, 1927. Pl. 14, fig. 10.

1927 *Scrinium sandersonae* Bucknill, Trans. N.Z. Inst. 58, p. 311, Pl. 35, f. 1.

Holotype in Auckland Museum.
Locality: Matauri Bay, near Whangaroa.

Genus **Awateria** Suter, 1917.

Type (o.d.): *A. streptophora* Suter, 1917 (Waitotaran) Lower Pliocene, N.Z.

The exact status of this New Zealand Lower Pliocene genus is difficult to determine, for the protoconchs of all known specimens are badly eroded. Suter (1917, p. 57) describes the protoconch as "consisting of $1\frac{1}{2}$ whorls, the nucleus with its initial point erect, but is then suddenly immersed to the extent of one-quarter or one-half volution,leaving a triangular or semicircular depression." The genus appears closely allied to *Gymnobela* Verrill, 1884, type (s.d. Cossmann 1896) *G. eugonia* Verrill, an East American abyssal rarity. If *Gymnobela extensa* Dall is correctly assigned to that genus, then *Awateria* is so close that it may be synonymous or at most separable as a subgenus. As satisfactory figures of the genotype of *Gymnobela* are unavailable and Dall, 1908 (Albatross Reports, Bull. Mus. Comp. Zool., 43, no. 6, pp. 278-280) included such an incongruous assortment under the genus, one can only leave the matter for subsequent elucidation, meanwhile crediting *Awateria* with generic status for New Zealand usage.

Hedley (1922, p. 232) referred to *Awateria* four Recent species, *Pleurotoma (Drillia) challengeri, crossei, hoylei* and *watsoni* (the last three doubtfully) all of Smith 1891 (Proc. Zool. Soc. 1891, pp. 438-439) and all from 410 fathoms off Sydney ("Challenger"). It is impossible to state from the original descriptions and figures if these species have been correctly assigned to *Awateria* except that the first mentioned does bear considerable resemblance to that genus.

The range of *Awateria* in New Zealand is (Taranakian) Upper Miocene to (Nukumaruan) Middle Pliocene.

Key to Species of Awateria.

A. Shell ovate-cylindrical.
- Moniliform subsutural fold very massive.
  - Spire whorls with strong, blunt axials interrupted by deep narrow sinus area.
    - Axials crossed low down by 1 or 2 weak spiral grooves .... *streptophora* (Suter)
    - Axials crossed medially by a deep spiral groove .... *evanida* (Suter)
  - Spire whorls with one spiral series of nodules additional to subsutural fold.
    - Spire less than height of aperture.
      - Nodules or gemmules bluntly rounded.
        - Base with axials abruptly terminated by groove .... *defossa* n. sp.
        - Base with long thin axials reaching neck .... *marwicki* n. sp.

Spire $1\frac{1}{2}$ times height of aperture.
Nodules prickly .... *echinata* n. sp.
Moniliform subsutural fold moderate.
Spire whorls with strong spirals and weak axials.
Spirals 2, additional to subsutural fold.
Spire $1\frac{1}{2}$ times height of aperture .... *mollyae* King
Spirals 3, additional to subsutural fold.
Spire equal to height of aperture .... *karakaensis* Marwick
Spire $1\frac{1}{2}$ to twice height of aperture.................................. *retiolata* King
Spirals 4, additional to subsutural fold.
Axials broad; spirals narrow, interspaces twice their width .... *thomsoni* n. sp.
Axials thin, subobsolete; spirals narrow, much wider spaced .... *wairoaensis* n. sp.

B. Shell broadly biconic.
Moniliform subsutural fold moderate.
Axials narrow, strong, numerous.
Heavy peripheral nodulous band.
Spirals weak, interstitial .... *personata* n. sp.

Awateria defossa n. sp. Pl. 11, fig. 7.

Shell small, with depressed spire, which is less than height of aperture. Spire whorls showing a spiral row of blunt rounded nodules at each suture, 14-15 per whorl. Upper sutural row representing the subsutural fold; the lower sutural row being the peripheral crest of longish axials which occupy half the height of the base. The bottoms of these axials abruptly terminate at a deep, narrow median basal groove bordered below by a weakly nodulated spiral cord and followed distantly by a second one near the anterior canal. Axials weakly continuous across the broad shallow shoulder. Two very indistinct spiral cords cross the long basal axials.

Height, 6.25 mm.; diameter, 3.8 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. loc. 1523, Mangapoike River below road above Big Bend above Te Puna, Poiti (N.E.) S.D., Wairoa; N.Z. G.S. loc. 1524, 10 chains down stream from 1523 (Holotype) ("Mapiri" = Taranakian) Upper Miocene.

Awateria marwicki n. sp. Pl. 11, fig. 5.

Shell small, ovate, with depressed spire, which is less than height of aperture. Spire whorls with a moderately strong subsutural fold and a medially situated, strong, rounded peripheral cord. The shoulder is deeply concave and there is a deep, narrow groove beneath the peripheral cord. On the base there are five broad, flat, linear spaced cords, followed by five narrowly rounded cords with interspaces twice the width of the cords, each interspace with a weaker cord.

Narrow rounded axials, about 18 per whorl, extend from the periphery to the anterior canal and weakly connect across the shoulder, rendering both the subsutural fold and the peripheral cord gemmulate to weakly nodulous. Apical whorls missing in sole example.

Height, 5.2 mm.; diameter, 3 mm.; (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1523, Mangapoike River below road above Big Bend above Te Puna, Poiti (N.E.) S.D., Wairoa ("Mapiri" = Taranakian) Upper Miocene.

Awateria karakaensis Marwick, 1931.

1931 *Awateria karakaensis* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 144, Pl. 15, f. 290.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1290, Ormond Series, Gisborne (Opoitian) Lower Pliocene.

Awateria echinata n. sp. Pl. 11, fig. 2.

Shell small. Spire 1½ times height of aperture. Protoconch blunt, paucispiral, worn, but showing distinct, closely spaced, slightly concave brephic axials on last half whorl. Sculpture consisting of spiral series of strong prickly nodules, which are connected vertically by thin lamellate axials. Spire whorls with two equally strong spiral series, the upper one representing the characteristic subsutural fold. On the base a third spiral series emerges from the lower suture and there are three others below, all widespread and each becoming successively weaker.

Height, 4 mm.; diameter, 2 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc., 1508, Kinikini, light grey mudstone below limestone. Mahia (N.W.) S.D., Wairoa (top of Opoitian?) Lower Pliocene.

Awateria personata n. sp. Pl. 11, fig. 3.

Shell of moderate size, broadly biconic, flat-shouldered, with tabulated spire and a prominent peripheral nodulose band. Moderately strong moniliform subsutural border and crisp arcuate axials, having weak flattened linear spaced interstitial spiral cords becoming stronger and wider spaced below the axials on the neck. Spire less than height of aperture. Protoconch paucispiral, badly eroded. Axials 23 on body-whorl. Spirals two on spire-whorls, sixteen on body-whorl and three on anterior canal. Shoulder without spirals but bearing weak lamellar axials connecting the subsutural and peripheral nodules.

Height, 7 mm.; diameter, 4.1 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: N.Z. G.S. locs. 1543, mudstone and argillaceous sandstone beds, Mangawhero Stream, Taramarama (S.W.) S.D., Wairoa; (Holotype) 1570, Road, ¾ mile north of road forks at head of Waihua River, Waiau, S.W., Wairoa S.D. (Opoitian) Lower Pliocene.

This species bears striking resemblance to both *Gymnobela blakeana* Dall, 1881 (Dall 1889, Pl. 10, f. 1) from off Yucatan, Gulf of Mexico in 640 fathoms, and *Lora brachis* Dall (1919, p. 41, Pl. 7, f. 3) from the Galapagos Islands in 812 fathoms. However, both these species lack the subsutural moniliform fold which is a feature of *Awateria,* but not exclusive to it. Grant & Gale 1931 (p. 524) considered *Gymnobela* as differing from *Lora* only by the absence of an operculum.

A new species not good enough for description but apparently ancestral to *personata* n. sp. occurs at N.Z.G.S. loc. 1524 (Taranakian) Upper Miocene. This has a very narrow and much weaker subsutural border. Neither *personata* nor the n. sp. just mentioned are typical of *Awateria,* but they may be classed as such until better material allows of more critical comparison.

Awateria thomsoni n. sp. Pl. 11, fig. 1.

Shell small, ovate-cylindrical. Spire 1.3 times height of aperture. Whorls rounded, with moderate subsutural fold, a deep narrow sinus area and four narrow, sharply raised spiral cords on spire whorls followed by a further eight on the base; interspaces about twice width of cords. Axials broad, fold-like, but rather weak, 16-17 per whorl. The subsutural fold and the upper cords are rendered nodulous, but those on the base are smooth.

Height, 15 mm.; diameter, 7.5 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Lower end of Starborough Creek, Marlborough (Waitotaran) Lower Pliocene. Collected by the late Dr. J. Allan Thomson.

Awateria streptophora Suter, 1917.

1917 *Awateria streptophora* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 57, Pl. 12, f. 19.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Awatere River, left bank above Seddon Railway Bridge, Marlborough (Waitotaran) Lower Pliocene.

Awateria wairoaensis n. sp. Pl. 11, fig. 6.

Spire about 1.3 times height of aperture. Sculpture consisting of narrow, sharply-raised, wide-spaced spiral cords, four on spire whorls and about ten on body-whorl. The subsutural fold is narrow and not very prominent, smooth to very obscurely crenulated, not gemmate. Weak, very narrow axials, 14 per whorl, render the upper cords of the spire whorls weakly tuberculate; axials obsolete over body-whorl.

Species related to both *karakaensis* Marwick and *mollyae* King, all three having a weaker subsutural fold than in the genotype, and sculpture of narrow, wide-spaced cords crossed by very weak axials. The only other *Awateria* with four spirals on the spire-whorls is *thomsoni* n. sp., but it has a stronger subsutural fold, closer-spaced spiral cords and much broader axials. In *mollyae* the spiral cords are much wider-spaced than in *wairoaensis*, and they are reduced to two on the spire-whorls; *karakaensis* has three cords additional to the subsutural fold on the spire whorls.

Height, 10 mm.; diameter, 4.5 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1215, mudstone with pumice fragments, coast, 1-2 miles west of mouth of Wairoa River, Hawke's Bay. Clyde and Waihua S.D. (Waitotaran) Lower Pliocene.

Awateria evanida Suter, 1917.

1917 *Awateria streptophora evanida* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 57, Pl. 12, f. 20.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Awatere River, left bank above Seddon Railway Bridge, Marlborough (Waitotaran) Lower Pliocene.

Awateria retiolata King, 1933.

1933 *Awateria retiolata* King, Trans. N.Z. Inst. 63, p. 351, Pl. 36, fig. 12.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Cliffs east of Lake Ferry, Palliser Bay (Nukumaruan) Middle Pliocene.

Awateria mollyae King, 1933. Pl. 11, fig. 4.

1933 *Awateria mollyae* King, Trans. N.Z. Inst. 63, p. 351.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Cliffs east of Lake Ferry, Palliser Bay (Nukumaruan) Middle Pliocene.

Genus **Thesbia** Jeffreys, 1867.

The reference of Watson's *Pleurotoma (Thesbia) membranacea* and *xanthias* to *Thesbia* Jeffreys, 1867, could hardly be less appropriate. The genotype, *Thesbia nana* (Loven, 1846) is a tiny shell resembling a delicately spirally striated Pyrenid, although the genus is definitely Turrid, as has been shown by the radula (Forbes & Hanley 1851, "A History of British Mollusca," 3, p. 462). It is a boreal deep water species having a very blunt, paucispiral, mammillary, unsymmetrically coiled, smooth protoconch and a small shallow sinus.

Thiele (1925, p. 232, pl. 28, f. 14) describes and figures an East African species as *Thesbia algoaensis*, but this seems to be a Pyrenid allied to *Zafra*.

The New Zealand (Wangaloan) *Eothesbia* Finlay & Marwick, 1937, p. 88, is compared with *Thesbia*. and so far as one can judge from the imperfect material there may be some relationship. *Eothesbia* differs from *Thesbia* in having a conoid protoconch of 4½ smooth whorls with a small nucleus, and a very broad open sinus extending from the suture to below the periphery. Even the subfamily location of *Thesbia* and *Eothesbia* is doubtful, but for the present they may be tentatively referred to the *Borsoniinae* along with the other Pyreniform and Mitriform Turrids.

Watson's species, however, are described as having "a deep broad sinus which lies up at the very suture and with no shelf at the insertion; below the sinus the edge of the lip sweeps forward in a great wing-like curve." The protoconch in each species is either worn or damaged, but that of *xanthias* is described as probably of 3-3½ whorls, but the apex is lost and only 2 whorls remain, "microscopically scored by minute narrow raised lines which are straight above, but below slope very quickly to the left."

Although the evidence of the protoconch is not conclusive, the sinus indicates the *Daphnellinae* and excludes any relationship with *Thesbia*. Also Watson's species range from 19.5 to 22 mm. in height as compared with a maximum of 6 mm. for the diminutive *Thesbia nana*.

Watson's species are from "Challenger" dredgings in 1100 fathoms off Cape Turnagain, and they have not been collected since. I have not seen the types, but Watson's excellent descriptions and figures leave no doubt that these deep-water New Zealand shells are congeneric and represent a new genus related perhaps to *Typhlosyrinx* Thiele, 1925, and *Pontiothauma* Smith, 1894. It may seem unwise to nominate a new genus on a species I have not seen, but on the other hand it is less desirable to force these species into an existing group to which they bear no relationship. See *Xanthodaphne* under the *Daphnellinae*.

Genus **Eothesbia** Finlay & Marwick, 1937.

Type (o.d.): *E. microtomoides* Finlay & Marwick. (Wangaloan) Upper Cretaceous, N.Z.

Eothesbia microtomoides Finlay & Marwick, 1937.

1937 *Eothesbia microtomoides* Finlay & Marwick, N.Z. Geol. Surv. Pal. Bull. 15, p. 88, Pl. 12, figs. 5, 8.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Wangaloa (type) ; Boulder Hill (Wangaloan) Upper Cretaceous.

MANGELIINAE.

Genus **Neoguraleus** Powell, 1939.

Type (o.d.): *Drillia sinclairi* Gillies 1882, Recent, N.Z.

In Rec. Auck. Inst. & Mus. vol. 2, no. 4, p. 236, this genus was proposed to cover a series of New Zealand Recent and Tertiary species previously ascribed to the Australian genus *Guraleus* Hedley, 1918. *Neoguraleus* resembles the Australian *Guraleus* in shape, size, sculpture, and broad, shallow sinus occupying the shoulder, but has a different protoconch. In *picta* Adams and Angas, the genotype of *Guraleus*, the protoconch is polygyrate, dome-shaped and smooth. In *Neoguraleus* it is polygyrate also, but only the tip, one to one and a half whorls is smooth, the remainder being fenestrate—heavy spiral keels and weak, closely spaced axials. The canal is moderately short and suddenly twisted low down, as opposed to the following sub-genus, which has a long, slender neck and canal. *Neoguraleus* typical is represented by a number of Recent species, but only a few Tertiary members, extending back as far as the (Awamoan) Middle Miocene.

Key to Species of Neoguraleus.

1. sinclairi line.

A. Spiral sculpture fine and dense, with a few stronger threads.

a. Colour bands complex, not interrupted by axials.

Base gradually contracted. Spire whorls sagging; 13-16 axials per whorl...*sinclairi* (Gillies)

Base suddenly contracted. Spire whorls high shouldered; 9 axials per whorl *whangaroaensis* n. sp.

b. Colour bands interrupted by axials.

Shell tall and narrow; axials 12 per whorl .... *sandersonae* n. sp.

Shell broad and squat; axials 14-16 per whorl .... *interruptus* n. sp.

B. Spiral sculpture somewhat coarser with a few still stronger cords.

Spire about equal to height of aperture.

Shell narrow.

Axials 8-9 per whorl very strong .... *manukauensis* n. sp.

Axials 12-13 per whorl, rather narrowly rounded .... *murdochi* (Finlay)

Axials 11-12 per whorl. Differs from all others in having pillar twist, obsolete **deceptus* n. sp.

Shell broad and squat.

Axials 12 per whorl .... *huttoni* (Smith)

Spire $1\frac{1}{2}$ times height of aperture or more.

Axials 8-9 per whorl, very strong .... **nukumaruensis* n. sp.

Axials 11 per whorl, rather narrowly rounded .... *benthicola* n. sp.

C. Spiral sculpture regular; in one series, confined to axial interspaces.

Axials 14-15 per whorl, slightly shouldered near suture .... *finlayi* n. sp.

Axials 22-25 per whorl; whorls convex .... *oruaensis* n. sp.

2. lyallensis line.

Spiral sculpture fine, axials broad, strong, fold-like, unicoloured except for dark patch on neck.

Shell of moderate size (12-13 mm.).

Spire whorls vertically compressed. Axials obsolete on last whorl .. *tenebrosus* (Powell)

Spire whorls less telescoped. Axials persistent .... *lyallensis* (Murdoch)

Shell larger (17 mm.).

Axials strong on spire, restricted to shoulder on body-whorl .... **morgani* (Marwick)

3. amoenus line.

Shell elongate, loosely coiled, with tall spire.

Axials 15-20 per whorl. Whorls rounded or but slightly shouldered.

Axial and spiral sculpture strong, persistent. Body-whorl moderately broad. Base suddenly contracted .... *amoenus* (Smith)

Axial sculpture subobsolete on later whorls. Shell very narrow. Base slowly contracted .... **protensus* (Hutton)

Axial sculpture persistent. Close to *protensa* in shape, but smaller **ngatuturaensis* (Bartrum & Powell)

Whorls distinctly medially angled.

Axials 15-16 per whorl, subobsolete on shoulder and not extending below suture **waihuaensis* n. sp.

4. lineatus.

Shell broadly fusiform, whorls shouldered; resembling *Anacithara*.

Axials very strong, 11 per whorl .... **lineatus* (Marwick)

1. sinclairi line.

Neoguraleus deceptus n. sp. Pl. 9, fig. 12.

Whorls moderately convex, not angled. Sculptured with rather broad and rounded axials, almost reaching the fasciole, 12 on penultimate, 11 on body-whorl, crossed by weak primary cords, weaker intermediates, and still finer subsidiary striae. There are three primary cords on the spire whorls, uppermost just above middle, each interspace with a slightly weaker cord On the base there are nine alternately strong and weaker cords, and a further four, heavier and linear-spaced, on the neck. The fasciole bears much finer and very indistinct linear spaced threads. Spire slightly taller than aperture plus

canal. Whorls 6½, including typical polygyrate protoconch. Aperture rather narrow, with moderate subsutural sinus, but a comparatively short canal and only slightly flexuous pillar, not suddenly twisted as in *Neoguraleus* typical.

Height, 6 mm.; diameter, 2.3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Target Gully, Oamaru (Awamoan) Middle Miocene.

This small species is almost a replica of the Upper Pliocene-Recent *Neoguraleus murdochi,* even to a correspondingly short beak, but the characteristic pillar-twist is undeveloped. Except for the short canal, *deceptus* could well be a *Fusiguraleus.* No doubt the species marks the approximate point of divergence of the *Neoguraleus* line from the *Fusiguraleus* stock.

Neoguraleus nukumaruensis n. sp. Pl. 5, fig. 3.

Shell fusiform, robust, sculptured with a few very heavy, broadly-rounded axials, extending over base almost to fasciole, 9 on penultimate and 8 on body-whorl. Spiral sculpture of numerous fine threads and two strong cords on the spire whorls, upper one just above the middle, lower one midway between the upper one and lower suture. On the base there are five spaced primary cords, the uppermost proceeding from the lower suture. The neck and fasciole bear the usual linear-spaced spirals. The species is nearest to *murdochi,* from which it differs in having fewer and much stronger axials and a more quickly contracted base.

Height, 7.2 mm.; diameter, 3.3 mm. (apex missing) (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: N.Z. G.S. loc. 2312, Ongaonga Road, Waipukurau (S.W.) S.D.; Nukumaru (type) (Nukumaruan) Middle Pliocene.

Neoguraleus murdochi (Finlay, 1924), Pl. 6, fig. 9.

1900 *Clathurella corrugata* Murdoch (non Dunker, 1871). Trans. N.Z. Inst. vol. 32, p. 219, Pl. 20 ,f. 8. "Blue-clay cliffs, west of Wanganui Heads."

1924 *Asperdaphne murdochi* Finlay, nom. nov. for *corrugata* Murdoch. Proc. Malac. Soc. vol. 16 p. 104.

1939 *Neoguraleus murdochi* : Powell, Rec. Auck. Inst. Mus. vol. 2. no. 4, p. 236.

The type is an Upper Pliocene fossil from Castlecliff, Wanganui, but the species is also widely distributed over North and South Island Recent localities. Its narrowly fusiform shape and 12-13 strong but rather narrow axials (10-11 in type, which is a young shell), with fine but distinct spiral threads, and spaced heavier cords, make it readily recognisable. Compared with *sinclairi, murdochi* has the axials narrower, more clear cut and extending lower on the base; the primary spiral cords, three on spire whorls, lowest at suture, are stronger and quite distinct on the body-whorl. In *sinclairi* the primary spirals become obsolescent on the last whorl; the colour pattern (not always present) is similar, except that there is a very broad medial pale zone and the whole of the base except the tip of the fasciole is dark zoned. There is the usual sutural darker band on the body-whorl. In *sinclairi* and the allied *whangaroaensis* the pale band is always narrow. Dredged specimens are usually uniformly dark-brown or slate-grey.

Height, 7 mm.; breadth, 3 mm. (Holotype). Height, 9 mm.; breadth, 3.6 mm. (Stewart Id.).

Localities: Taradale Bridge, Hawke's Bay (Nukumaruan) Middle Pliocene; Castlecliff, Wanganui (Castlecliffian) Upper Pliocene (Holotype); Recent, Stewart Island; Dunedin Harbour; Moeraki; Evans and Day's Bays, Wellington; Cheltenham, Auckland; Orua Bay, Manukau Harbour; Great Barrier Island 6-10 fath.; Awanui Bay in 12 fath.; Cooper's Beach, Manganui.

Neoguraleus sinclairi (Gillies, 1882). Pl. 6, fig. 1.

1878 *Defranchia luteo-fasciata* : Hutton, Journ. de Conch. vol. 26, p. 17 (non Reeve 1845) Lyttelton cited.

1880 *Defranchia luteo-fasciata* : Hutton, Man. N.Z. Moll., p. 45, Stewart Id.-Auckland, Chatham Islands.

1881 *Defranchia luteo-fasciata* : Hutton, Trans. N.Z. Inst., vol. 13, p. 201, "Not uncommon on seaweed in Port Lyttelton."

1882 *Drillia sinclairi* (Smith ms.) Gillies, Trans. N.Z. Inst., vol. 14, p. 170.

1884 *Pleurotoma (Mangilia ?) sinclairii* E. A. Smith. Ann. Mag. Nat. Hist. (5) vol. 14, p. 320. N.Z. (Dr. Sinclair).

1913 *Mangilia sinclairi* : Suter, Man. N.Z. Moll., p. 504.

Hutton (1878) identified Lyttelton shells as Reeve's *luteo-fasciata,* a West Indian species. Gillies' *sinclairi* was an advance notification of E. A. Smith's *sinclairii* rather than an attempt to rename Hutton's *luteo-fasciata,* although in effect this is the result of Gillies' action. The question raised is one of type locality. If Gillies' name was a straight out re-nomination of Hutton's species, then "on seaweed Port Lyttelton" would be the type locality, but as an advance notification of Smith's *sinclairii* the position is that apart from Hab. New Zealand (Dr. Sinclair) no precise location in New Zealand was given. Moreover, Smith did not refer to Hutton's *luteo-fasciata* in any way. However, it seems likely that Dr. Sinclair's collection was from South Island sources in any case. I have never collected *Neoguraleus* from seaweeds unless "sea-grass" *Zostera* on mud-flats is intended, the species being frequently found crawling on mud-flats in association with *Zostera.*

A specimen from Moeraki is figured as probably representing typical *sinclairi,* being the normal form of the shell attributed to this species This shell has only 13 axials on the penultimate, as against 16 cited in Smith's description, but has the characteristic sutural reddish-brown bands.

Height, 9.25 mm.; diameter, 3.75 mm. (Moeraki, Finlay coll.).

Localities: Stewart Island; Moeraki; Lyall Bay, Wellington; Milford, Auckland.

Neoguraleus whangaroaensis n. sp. Pl. 6, fig. 2.

This is the northern (Aupourian) representative of *sinclairi,* being usually of somewhat smaller size, with sub-shouldered, strongly convex whorls, rapidly contracted base, and fewer, broader and stronger axials. Compared with *whangaroaensis, sinclairi* is more elongate, with slightly sagging whorls and more numerous axials, 13 to (16 in the type). Penultimate and body-whorls in *whangaroaensis* each with 9 axials. Spire 1.3 times height of aperture. Colour buff, with a moderately thick supra-sutural spiral band of dark purplish-brown, pillar similarly coloured; a median red-brown spiral line divides the whorls into a pale yellowish-brown zone extending to upper suture, and a zone of the buff ground colour descending to the suprasutural band. On the base the yellowish-brown zone descends almost to the fasciole.

Height, 8 mm.; diameter, 3.5 mm. (Holotype).

Holotype presented to Auckland Museum.
Localities: Taupo Bay, Whangaroa (Holotype); Mangonui Heads; Takapuna, Auckland.

"Neoguraleus goodingi (Smith, 1884)."

1884 *Pleurotoma (Mangilia) goodingii* E. A. Smith. Ann. Mag. Nat. Hist. (5), vol. 14, p. 320. New Zealand.

This unfigured and indefinitely localised species is not recognisable in the large series of specimens of the genus examined. Smith made special reference to the "spiral row of reddish dots on the ribs, two on the upper whorls and three on the last." Colour dots or interrupted bands do occur in *Neoguraleus,* but are invariably in the intercostal spaces, not on the ribs themselves. Even if a mistake was made and the dots were actually

between the ribs I have not seen a specimen that tallies in having 9-10 axials and three rows of dots on the body-whorl. Most likely Smith's species was founded on an exotic shell, so without access to the British Museum type the name *goodingi* should be provisionally suspended from the New Zealand fauna.

The following two new species have interrupted colour bands, the dots occurring between the ribs, and cover the shells previously ascribed to *goodingi* by New Zealand authors.

Neoguraleus sandersonae n. sp. Pl. 6, fig. 5.

Shell fusiform, whorls evenly and stongly convex; base regularly contracted. Spire slightly taller than aperture plus canal. Whorls 7, including typical protoconch. Axials strong, rounded, rather distant, vertical, extending almost to fasciole, 12 on body-whorl. Spiral sculpture indefinite, stopped by the axials and consisting of a series of indistinct threads and two stronger cords on each of the spire whorls. Base, neck and fasciole with weak regularly spaced threads, those on the fasciole being linear-spaced. Colour pattern of two broad zones of light reddish-brown, on a buff ground, which shows as a broad medial band on the spire whorls. On the body-whorl the lower band extends over the base to the fasciole, and there is a moderately wide band of slightly deeper colour proceeding from the lower suture. Colour zones and the band are all interrupted by the axials. There is also a reddish-brown stain on the lower inner-lip callus and fasciole.

Height, 9.4 mm.; diameter, 4 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.
Locality: Whangaroa (Mrs. F. W. Sanderson).

Neoguraleus interruptus n. sp. Pl. 6, fig. 6.

Shell squat and broad, whorls strongly convex, narrowly slightly shouldered, sculptured with numerous, vertical, broad, bluntly rounded prominent axials, extending from suture to suture and over the base to the neck. Whorls 7, including a typical dome-shaped protoconch (as already described) of 3½ whorls. Sixteen axials on penultimate whorl (varying between 14 and 16 in paratypes). Spire slightly higher than aperture. Anterior canal very short and widely open. Sinus very weak, situated at shoulder. Spiral sculpture of weak spiral cords, of which three on upper whorls, four on penultimate, and about four on the base are slightly stronger. All spirals are interrupted by the axials. The neck and fasciole is sculptured with ten distinct linear-spaced spiral cords. Colour creamy-buff with two moderately broad reddish-brown spiral bands interrupted by the axials; one sutural band at shoulder and a second on body-whorl, proceeding from the lower suture; the neck also is similarly coloured.

Height, 8.25 mm.; diameter, 4.25 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.
Localities: Mercury Bay (Holotype); Auckland Harbour (Dr. H. J. Finlay collection); Taupo Bay, Whangaroa.

Neoguraleus benthicola n. sp. Pl. 6, fig. 3.

This is a deep-water representative of *murdochi,* differing in having a much taller spire, one and two thirds height of aperture, strongly convex whorls angled above the middle, and more distinct spiral threads, with the three spiral cords much stronger, the uppermost causing the whorl angle. Axials prominent, broadly rounded and crossed by spirals, eleven per whorl . Four stronger, spaced spirals on the base, five strong, closely spaced ,on the neck, and seven minute linear-spaced threads on the fasciole. Colour uni-

formly buff except for a suspicion of a moderately wide pale brownish band proceeding from the lower suture on the body-whorl, and a tinge of the same colour on the fasciole and neck.

Height, 8.1 mm.; diameter, 3 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.

Locality: 50 fathoms off Oamaru, N.Z.

Neoguraleus huttoni (Smith, 1915).

1915 *Mangilia huttoni* E. A. Smith. Moll. "Terra Nova" Expd. Zool. vol. 2, no. 4, p. 88, Pl. 1, fig. 29.

This is a squat relative of *murdochi,* having 12 axials per whorl, all of which are crossed by the fine spiral sculpture. The coloration is whitish with the base light brown, a broad, darker, reddish-brown band on the body-whorl proceeds from the lower suture, and the fasciole is similarly coloured. Spire-whorls with an indistinct upper sutural light-brown band, leaving a broad median whitish band below it.

Holotype in British Museum (Natural History).

Localities: Near North Cape in 11-20 fathoms (Holotype); Cape Maria van Diemen (Finlay collection).

Neoguraleus manukauensis n. sp. Pl. 6, fig. 4.

This is the most distinctive species of the group. It is related to *murdochi,* having a similar dull colour pattern and the spiral sculpture crossing the axials. Shell fusiform with narrow base. Spire same height as aperture. Axials strong, blunt, distant, strongly arcuated by sinus, nine on penultimate, eight on body-whorl. Spiral sculpture as in *murdochi,* consisting of close, crisp threads, which cross the axials. About 12 weak linear-spaced spiral cords on neck and fasciole. Colour dull brown to leaden, with a single moderately broad white band on lower half of whorls. Sinus subsutural, slightly deeper than is usual in genus. Canal moderate, long, open.

Height, 12.5 mm.; diameter, 5 mm. (Holotype).

Holotype in Auckland Museum.

Localities: Hillsborough, foreshore near Onehunga, Manukau Harbour (Mrs. M. E. Fairfield, Holotype); Orua Bay, Manukau Harbour.

Neoguraleus oruaensis n. sp. Pl. 6, fig. 7.

This and the following species are related, and form a sub-group characterised by having the spiral sculpture in one even series without the addition of spaced stronger members. Also the spiral sculpture does not cross the axials. Spire slightly higher than aperture. Whorls moderately convex with a weakly concave shoulder. Axials broadly rounded, very closely spaced, 22 on penultimate and 25 on body-whorl. Spiral cords weak, showing only in the narrow intercostal spaces and on the base. Neck and fasciole sculptured with ten weak linear-spaced spiral cords. Colour buff, with an indistinct light brown narrow upper sutural band, and a broad one over body-whorl extending from lower suture. Fasciole similarly coloured. The colour bands are not interrupted by the axials.

Height, 9.7 mm.; diameter, 4 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.

Locality: Orua Bay, Manukau Harbour.

Neoguraleus finlayi n. sp. Pl. 6, fig. 8.

1900 *Clathurella sinclairi* : Murdoch (non Gillies 1882 or Smith 1884). Trans. N.Z. Inst., vol. 32, p. 218, Pl. 20, fig. 7. Blue-clay cliffs west of Wanganui Heads = Castlecliff (Upper Pliocene).

Spire $1\frac{1}{2}$ times height of aperture, outlines flatly convex, shoulder narrow and flattened, producing a slightly tabulated effect. Axials strong, bluntly rounded, vertical, 14

on penultimate, 15 on body-whorl. Spirals stronger than in *oruaensis*, moderately wide and flat, with linear interspaces and confined to intercostal spaces. Spirals on base and neck coarse, those on fasciole much finer and closer spaced. Sinus subsutural, shallow. Canal moderately long. Colour drab, as all material consists of dead shells; one, however, shows traces of banding identical with that of *oruaensis*.

Height, 10.25 mm.; diameter, 4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Castlecliff, Wanganui (Castlecliffian) Upper Pliocene; Dunedin Harbour (Holotype); Purau Bay, Lyttelton (dredged).

A solitary specimen in the N.Z. Geological Survey Collection from Waikopiro Creek, S.E. of Ormondville, Petane Beds, Hawke's Bay, has finer spirals, but more material is required to decide its exact status.

2. lyallensis line.

Neoguraleus morgani (Marwick, 1924).

1924 *Mangilia morgani* Marwick, Trans. N.Z. Inst., vol. 55, p. 201, Pl. 17, f. 14.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1063, shell-bed, Okawa Creek, Ngaruroro River, Hawke's Bay. Mid-Pliocene (Nukumaruan).

Neoguraleus lyallensis (Murdoch, 1905).

1905 *Drillia lyallensis* Murdoch, Trans. N.Z. Inst., vol. 37, p. 221, Pl. 7, fig. 7.
1913 *Drillia (Cymatosyrinx) lyallensis* : Suter, Man. N.Z. Moll., p. 482.

Holotype in Dominion Museum, Wellington.

Localities: Lyall Bay, Wellington (Holotype); Stewart Island; Waikouaiti; Dunedin Harbour; Opotiki, Bay of Plenty.

Neoguraleus tenebrosus (Powell, 1926).

1926 *Guraleus tenebrosus* Powell, Proc. Malac. Soc., vol. 17, p. 37, text fig.

Holotype in writer's collection, Auckland Museum.

Localities: Taupo Bay, Whangaroa (Holotype); Cape Maria van Diemen; Devonport, Auckland.

3. amoenus line.

Neoguraleus ngatuturaensis (Bartrum & Powell, 1928).

1928 *Guraleus ngatuturaensis* Bartrum & Powell, Trans. N.Z. Inst., vol. 59, p. 151, Pl. 28, figs. 34. 35.

Holotype in Auckland University College.

Locality: Kaawa Creek, S. of Port Waikato (Opoitian) Lower Pliocene.

Neoguraleus waihuaensis n. sp. Pl. 13, fig. 11.

Species resembling *amoenus*, but with medially distinctly angulate whorls and a much narrower body-whorl. Spire 1.3 times heght of aperture. Axials narrowly rounded, 15-16 per whorl, subobsolete on shoulder and not extending below lower suture. Primary spiral cords weak, two on spire whorls, uppermost at angle and a third emergent from suture on body-whorl; below this there are eight on the base. There is a weak thread in each of the interspaces except on the lower part of the base. The shoulder bears from 4-6 fine crisp spiral threads.

Height, 6.4 mm.; diameter, 2.4 mm. (Holotype).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1560, Waihua River, ¾ mile upstream from Ngamahanga Stream, Wairoa Subdivision (Waitotaran) Lower Pliocene.

Neoguraleus protensus (Hutton, 1885).

1885 *Daphnella protensa* Hutton, Trans. N.Z. Inst. vol. 17, p. 317.

Holotype in Canterbury Museum, Christchurch.
Locality: Petane Hawke's Bay (Nukumaruan) Middle Pliocene.

Neoguraleus amoenus (Smith, 1884).

1884 *Drillia ? amoena* Smith, Ann. Mag. Nat. Hist. (5), vol. 14, p. 318.
1913 *Mangilia protensa* : Suter, Man. N.Z. Moll. p. 502, Atlas of Plates (1915) Pl. 22, f. 5. Non *protensa* Hutton 1885.

Holotype in British Museum (Natural History).
Localities: Castlecliff, Wanganui (Castlecliffian) Upper Pliocene. Recent, New Zealand (Type, Smith); Auckland Harbour; Mount Maunganui, Tauranga; S. of Tiri Tiri Id., Hauraki Gulf (dredged); 25 fath. Hen and Chickens Is.; 23 fath. off Ahipara.

4. lineatus.

Neoguraleus lineatus (Marwick, 1928).

1928 *Guraleus lineatus* Marwick, Trans. N.Z. Inst. 58, pp. 491, 506, f. 139.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Flower Pot Harbour, Pitt Island, Chatham Islands (Opoitian) Lower Pliocene.

The unique holotype is not fully grown, so the protoconch appears abnormally large. The reticulated nuclear sculpture, however, is as in *Neoguraleus*, although the shell facies suggests *Anacithara*.

Subgenus **Fusiguraleus** n. subgen.

Type: *Clathurella leptosoma* Hutton (Awamoan) Middle Miocene, N.Z.

A large series of New Zealand Middle Tertiary shells are closely related to true *Neoguraleus*, having the protoconch practically identical, but showing some divergence in adult sculpture and shape, so that five well marked minor groups can be recognised. All these lines, however, have one adult shell feature in common, grouping them and at the same time differentiating them from *Neoguraleus* typical. This feature is the beak, which is much longer and more tapered, with the pillar either weakly flexuous or gradually twisted at most, and this invariably high up; never with the sudden twist, low down near the termination of an invariably short beak, as in *Neoguraleus* typical. The subgenus ranges from the Hutchinsonian to the Waitotaran, but only the one species, *sata* (Laws 1936) of the *leptosoma* series, is known to have survived the Awamoan.

Key to Species of Fusiguraleus.

1. Shell elongate-fusiform, with rounded or weakly shouldered whorls and excavated base.
    - Spiral sculpture fine, weak or subobsolete.
        - Axials broadly rounded, strong.
            - Shell large for group (15-16 mm.).
                - Axials 11-12 per whorl ..... *major n. sp.
            - (11 mm.).
                - Axials 9 per whorl ..... *flexicostatus n. sp.
            - Shell much smaller (5-6 mm.).
                - Axials 10-8 per whorl ..... *platycostatus n. sp.
    - Spiral sculpture stronger, dense and crisp, often granulated by weak axial growth striae.
        - Shell of moderate size (7-9 mm.).
            - Axials 7 per whorl ..... *raricostatus n. sp.
            - Axials 8 per whorl ..... *lawsi n. sp.
            - Axials 9 per whorl ..... *porrectus n. sp.
        - Shell smaller (6-6.5 mm.), shorter spired.
            - Axials 11 per whorl. Greatest whorl convexity above middle ..... *mancus n. sp.
            - Axials 10 per whorl. Greatest whorl convexity at middle ..... *nutans n. sp.

2. Shell broadly fusiform, strongly angulate at shoulder; of Cytharoid style (4.7-5.8 mm.).
Spiral sculpture moderate. Axials broadly rounded, strong.
Axials 10 per whorl .... *rigidus n. sp.
Axials 12 per whorl .... *marwicki n. sp.

3. Shell small, narrowly fusiform, with 2-3 spiral keels bunched together at periphery.
Base slowly tapered (4.5-6.5 mm.).
Two spiral keels on spire whorls.
Axials broad, strong, and persistent over body-whorl, 9 per whorl .... *granulatus n. sp.
Axials thin and weak, subobsolete on body-whorl, 13 on penultimate .. *angustatus n. sp.
Axials distant, 7 per whorl .... exsculptus n. sp.
Axials developed into vertically compressed nodules on keels .... *leptosomus (Hutton)
Three spiral keels on spire whorls.
Axials subobsolete on body-whorl, 12 on penultimate .... *subobsoletus n. sp.
Axials strong, rather distant, persistent, 12 per whorl .... *satus (Laws)

4. Shell elongate fusiform with evenly convex whorls. Spirals in one even series. No primaries.
Axials 16-17 on penultimate—27 on body-whorl .... *gracilentus n. sp.
Axials 15 on penultimate—19 on body-whorl .... *sutherlandicus n. sp.

SERIES 1.

Neoguraleus (Fusiguraleus) nutans n. sp. Pl. 7, fig. 10.

Shell rather small, fusiform, but broad and squat. Whorls vertically compressed, not angled, but with greatest convexity at middle and flattened above as a broad sloping shoulder. Axials strong, but fading out towards upper suture and over base. Whorls 7, including typical protoconch. Spiral sculpture of three closely spaced, inconspicuous, rounded spiral cords, on spire whorls, uppermost just below middle, ten on base and neck, upper three wide spaced, lower seven linear spaced. About ten weak spirals on fasciole, which is differentiated only by the change in relative strengths of the spirals. Spire same height as aperture. Apertural details similar to last species.

Height, 6.5 mm.; diameter, 2.7 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Otiake, Waitaki Valley (Waitakian) Upper Oligocene.

Neoguraleus (Fusiguraleus) mancus n. sp. Pl. 7, fig. 9.

Shell rather small, fusiform, but rather broad and squat. Whorls not angled, but the greatest convexity is just above the middle. Axials strong but rather narrowly rounded, vertical, not reaching neck. Whorls 6, including typical protoconch. Spiral sculpture of dense, fine threads, minutely granulated by fine axial striae, and with four stronger, narrow, primary cords on spire whorls, uppermost just above middle. Spirals on neck and fasciole fine, weak and undifferentiated. Spire about same height as aperture plus canal. Aperture broadly open above, but rapidly constricted below. Sinus broad and shallow, subsutural.

Height, 6.2 mm.; diameter, 2.7 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Target Gully, Oamaru (Awamoan) Middle Miocene.

SERIES 2.

Neoguraleus (Fusiguraleus) platycostatus n. sp. Pl. 8, fig. 9.

Shell rather small narrowly ovoid-fusiform, with a weak but distinct shoulder at upper three fourths. Axials very strong, vertical, blunt, broadly rounded, fading out rapidly on base, ten on penultimate, but only eight on body-whorl. Whorls flattened medially, base very slightly contracted, neck thick, merged into fasciole. Spire taller than aperture plus canal. Whorls 7, including protoconch. Spiral sculpture of weak,

rounded cords, becoming stronger and linear-spaced on neck and fasciole. Sinus broad and moderately deep, subsutural, occupying shoulder. Aperture narrow, very little contracted. Outer lip strengthened by a weak varix.

Height, 5.9 mm.; diameter, 2.2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (6c) Southland (Hutchinsonian) Lower Miocene.

Neoguraleus (Fusiguraleus) major n. sp. Pl. 7, fig. 3.

Shell very large for the genus, elongate-fusiform, with a very slight shoulder at upper three fourths. Axials strong, broadly rounded, slightly oblique, sinuated on the shoulder in conformity with the sinus, continued strongly over base but not reaching fasciole; they number 12 on the penultimate and 11 on the body-whorl. The spiral sculpture is obsolete, except for a few indistinct threads on the neck and fasciole. Spire tall, attenuated, one and a third times height of aperture plus canal. Whorls 9, including protoconch. Aperture, canal, sinus and protoconch all typical.

Height, 15.6 mm.; diameter, 5 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Ardgowan (type) and Target Gully, Oamaru. (Awamoan) Middle Miocene.

Neoguraleus (Fusiguraleus) flexicostatus n. sp. Pl. 7, fig. 5.

Shell large for the genus, elongate-fusiform, with a distinct shoulder angle at the upper three fourths. Axials strong, broadly-rounded, decidedly oblique and somewhat flexuous, especially on the shoulder, where they follow the curve of the rather deep, rounded sinus; continued strongly over base but not reaching fasciole; they number 9 on the penultimate and the same on the body-whorl. The spiral sculpture is subobsolete, three very weak primary cords showing on spire whorls, and about five indistinct primaries and some intermediates on the base. There are eleven more distinct spiral cords on the neck and fasciole. Spire same height as aperture plus canal. Whorls 8, including typical protoconch. Apertural characters typical.

Height, 11.1 mm.; diameter, 4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Pareora River (type), and Blue Cliffs, S. Canterbury (Awamoan) Middle Miocene.

Neoguraleus (Fusiguraleus) raricostatus n. sp. Pl. 8, fig. 8.

Shell of moderate size, elongate-fusiform, distinctly shouldered at upper two-thirds, whorls lightly convex below shoulder. Axials bluntly rounded, sparse, slightly flexuous, fading out on body-whorl at neck, and giving an octagonal appearance to the shell. There are seven axials on the body-whorl. Apart from the protoconch, the whole shell is crossed by close, rounded, but crisp spiral cords, four slightly stronger ones forming the primaries on the spire whorls, uppermost at shoulder angle. The spirals are worn from the crests of the axials, but normally they cross these undiminished. The fasciole is bounded above by a slight ridge. Whorls 7, including typical protoconch. Sinus broad and moderately deep, subsutural, occupying shoulder. Aperture narrow, constricted below to a long, slightly flexuous canal. Spire taller than aperture plus canal. The finer spiral sculpture is rendered minutely granulate by close, fine axial striae.

Height, 8 mm.; diameter, 2.7 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Ardgowan, near Oamaru (Awamoan) Middle Miocene.

Neoguraleus (Fusiguraleus) porrectus n. sp. Pl. 7, fig. 11.

Shell of moderate size, elongate-fusiform, scarcely subangled medially. Axials strong, narrowly rounded, vertical, weak towards upper suture, and fading out on base before reaching neck; nine on body-whorl. Whorls strongly convex, 7, including typical protoconch. Apart from the protoconch the whole shell is crossed by fine crisp spiral cords with four stronger primaries on spire whorls, uppermost above the periphery. The spirals on the canal and fasciole are moderately strong also, and linear spaced. Fasciole not defined by a ridge. Sinus and apertural details normal, as last species. Spire taller than aperture plus canal. The finer spiral sculpture is rendered minutely granulate by close, fine axial striae.

Height, 7.8 mm.; diameter, 2.8 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Pukeuri, near Oamaru (Awamoan) Middle Miocene.

Neoguraleus (Fusiguraleus) lawsi n. sp. Pl.7, fig. 8.

Shell of moderate size, elongate-fusiform, whorls very slightly shouldered above the middle. Axials very strong, and broadly rounded medially, but fading out towards upper suture, weak on base, and not reaching neck; eight on body-whorl. Whorls strongly convex, 8, including typical protoconch. Shell crossed by exceedingly fine and close spiral threads, and three stronger, but indistinct primary cords on spiral whorls, uppermost just above middle. Spirals on neck and fasciole linear spaced, weak, and indistinct. Fasciole undifferentiated. Sinus broad, weak, subsutural. Apertural details normal.

Height, 9 mm.; diameter, 3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Ardgowan, near Oamaru (Awamoan) Middle Miocene.

SERIES 3.

Neoguraleus (Fusiguraleus) rigidus n. sp. Pl. 7, fig. 6.

Shell small, fusiform, spire slightly vertically compressed, less than height of aperture plus canal. Whorls strongly convex, and angled above middle. Axials heavy, broadly rounded, not reaching fasciole, ten on body-whorl. Spiral sculpture consisting of one main moderately strong cord at angle, a weaker one below it, a third at lower suture, and another on base, as well as very fine close-spaced subsidiary threads over the whole shell; fasciole undifferentiated. Whorls 6, including typical protoconch. Aperture rather broadly open above, but constricted below to a narrowly open, slightly curved canal.

Height, 4.7 mm.; diameter, 2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (6c) Southland (Hutchinsonian) Lower Miocene.

Neoguraleus (Fusiguraleus) marwicki n. sp. Pl. 7, fig. 7.

Shell small, very similar to *rigidus* in shape and sculpture, except that it is slightly larger and wider, with more numerous, more narrowly rounded axials, which extend lower on the base but do not reach the fasciole. The axials number twelve on the body-whorl. Shoulder angle, spiral sculpture, and apertural details similar to those of *rigidus*. Whorls 6½, including typical protoconch. Spire same height as aperture plus canal. Both this and the above species resemble a Cytharid in build and sculpture, but neither in the aperture nor in the apex.

Height, 5.8 mm.; diameter, 2.4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (7a) Southland (Awamoan) Middle Miocene.

Neoguraleus (Fusiguraleus) exsculptus n. sp. Pl. 8, fig. 10.

Shell small, biconic-fusiform rather broad medially. Whorls sharply angled just below middle. Axials distant, strong, broadly rounded, spinose at angle; seven on body-whorl; weak towards upper suture and on base. Spiral sculpture of two closely-spaced strong cords on spire whorls, uppermost at angle, a third at lower suture on body-whorl, and about ten on the base, as well as subsidiary spiral threads on shoulder, interstices of main cords and on fasciole. Whorls 5½, including typical protoconch. Aperture and sinus normal. Spire a little less than height of aperture plus canal.

Height, 4.5 mm.; diameter, 2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (6c) Southland (Hutchinsonian) Lower Miocene.

A much larger single specimen from N.Z. G.S. loc. 1560, Waihua River, Wairoa Subdivision (Waitotaran) bears striking resemblance to *exsculptus.* It would appear, however, that the lower Pliocene shell is separable by having 8 axials per whorl and a longer extension of these axials over the base. More material of both *exsculptus* and this assumed new species is required to determine the exact status of the latter.

Neoguraleus (Fusiguraleus) granulatus n. sp. Pl. 7, fig. 2.

Shell small, narrowly biconic fusiform, moderately angled medially. Axials broad, fold-like, strong medially, but weak at upper suture and on base; nine on penultimate. Spiral sculpture of two primary cords crossing the axials on spire whorls, uppermost at angle, about five somewhat weaker ones spaced on upper part of base, and a number of linear spaced cords on neck and fasciole. In addition, there are close-spaced subsidiary spiral threads over all post-nuclear whorls, and these are rendered granulose by fine, dense, axial threads. The peripheral cord becomes weakly spinose where it crosses the axials. Whorls 6½, including typical protoconch. Spire slightly taller than aperture plus canal. Aperture narrow, elongate.

Height, 5.05 mm.; diameter, 1.9 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden 6a, Southland (Hutchinsonian) Lower Miocene.

Neoguraleus (Fusiguraleus) subobsoletus n. sp. Pl. 7, fig. 1.

Shell rather small, elongate-fusiform, with a moderate angle at upper two-thirds on early whorls, but slightly lower on body-whorl. Axial sculpture weak and subobsolete on body-whorl; twelve axials on penultimate. Spiral sculpture of weak but distinct rounded cords, and subsidiary threads on shoulder, and between cords. Three primary cords on spire whorls, uppermost at angle, lowest at, or just above, suture. On the base and neck there are twelve cords, the upper ones wider spaced, with a single thread in each interspace, and the fasciole bears indistinct threads. Spire shorter than aperture plus canal. Aperture long and narrow, with a broad, moderate, subsutural sinus, and produced below into a characteristic, rather long canal, slightly rounded at the tip. Whorls 7, including typical polygyrate protoconch of four whorls.

Height, 6.4 mm.; diameter, 2.5 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Target Gully (Type) and Ardgowan, near Oamaru (Awamoan) Middle Miocene.

Neoguraleus (Fusiguraleus) angustatus n. sp. Pl. 8, fig. 11.

Shell small, narrowly-biconic, fusiform, weakly angled just below the middle. Spiral sculpture more prominent than axial, consisting of two primary, narrow, sharply raised

cords on the spire whorls, close together, one at the angle and the other about half way towards the lower suture, a third at lower suture on body-whorl, followed by about 23 over the base, neck, and ill-defined fasciole; those on the base alternating in relative strength, but even and linear spaced over the neck and fasciole. The suture is submargined by a narrow bevelled ridge, and the shoulder bears five fine threads, the lowest somewhat stronger. The thin weak axials become subobsolete on the body whorl and throughout are rendered weakly gemmulate where crossed by the spiral cords; they number thirteen on penultimate. Spire shorter than aperture plus canal. Aperture narrow, with subparallel sides, having a broad, moderate subsutural sinus, and produced below into a long straight canal. Whorls 6, including typical protoconch.

Height, 4.7 mm.; diameter, 1.8 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Clifden, 8a, Southland (Awamoan).

Neoguraleus (Fusiguraleus) leptosomus (Hutton, 1885). Pl. 7, fig. 4.

1885 *Clathurella leptosoma* Hutton, Trans. N.Z. Inst. 17, p. 328.
1915 *Mangilia leptosoma* Suter, N.Z. Geol. Surv. Pal. Bull. 3, p. 40.

Holotype in Canterbury Museum, Christchurch.

Locality: White Rock River, Canterbury (type) (Awamoan) Middle Miocene.

The figured specimen is one of Hutton's six paratypes. These differ slightly from normal topotypes in having the keels rather stronger and more thickened where they cross the axials.

Neoguraleus (Fusiguraleus) satus (Laws, 1936).

1936 *"Liracraca" sata* Laws, Trans. Roy. Soc. N.Z. 66, p. 119, Pl. 17, f. 77.

Holotype in Auckland Museum (Dr. C. R. Laws collection).

Locality: Kaawa Creek (Opoitian) Lower Pliocene.

This is the highest stage reached by the subgenus, after which it seems to have become extinct. The species *satus* represents the termination of the following line:—*exsculptus, granulatus* (Hutchinsonian) *angustatus, leptosomus, subobsoletus* (Awamoan), and *satus* (Opoitian).

SERIES 5.

Neoguraleus (Fusiguraleus) gracilentus (Suter, 1917).

1917 *Mangilia gracilenta* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 56, Pl. 6, f. 19.

Locality: White Rock River, Canterbury (type) (Awamoan).

This species stands apart in having the whorls lightly and evenly convex, sculptured with numerous thin axials, almost twice the number on body-whorl as on earlier whorls, and with regular linear spirals in the interstices. From the protoconch and rather long anterior canal, however, its relationship seems to be with *Fusiguraleus.*

Neoguraleus (Fusiguraleus) sutherlandicus n. sp. Pl. 9, fig. 11.

Shell of moderate size, allied to *gracilentus,* but more elongate-fusiform, with similar spiral sculpture in one even series without primaries, but the whorls have a slight supramedian subangulation, and the numerical increase of the axials on the body whorl is not so disproportionate. In *gracilentus* the axials increase from 16-17 on the penultimate to 27 on the body-whorl. In *sutherlandicus* they are 13 on antepenultimate, 15 on penultimate

and 19 on body-whorl. Spire same height as aperture. The axials are weak, narrowly-rounded, and fade out just below the periphery on the body-whorl. Neck, fasciole, and canal longer than in *gracilentus*.

Height, 8 mm.; diameter, 2.7 mm. (Holotype).

Holotype in Auckland Museum (Dr. C. R. Laws collection).
Locality: Sutherland's, South Canterbury (Awamoan) Middle Miocene.

Genus **Vexiguraleus** n. gen.

Type: *V. clifdenensis* n. sp. (Hutchinsonian) Lower Miocene, N.Z.

From three horizons in the Hutchinsonian at Clifden, Southland, occurs a *Neoguraleus*-like shell, but with a discrepant apex. Whereas true *Neoguraleus* and the subgenus *Fusiguraleus* have a 4-whorled polygyrate protoconch with the tip, one to one and a half whorls smooth, the remainder fenestrate; that of *Vexiguraleus* has the smooth tip minute, of 1½ whorls also, but this is followed not by a fenestrate stage, but by two glossy whorls, with numerous narrow but distinct curved axial riblets, which are concave in front. Only on the last ¼ to ½ whorl do four extremely weak narrow spirals occur, and by this stage the axials have become more distant and broader, but no stronger. There is a slight terminal varix, after which the incipient spirals of the last half whorl of the protoconch develop into the usual sculpture of the group, consisting of broadly rounded axials crossed by a few primary spirals with secondary intermediates. The protoconch as a whole is dome-shaped, of four whorls with the minute tip central and helicoid. The pillar is as in *Fusiguraleus*, but the canal is of moderate length only, and not suddenly twisted as in the Recent-Pliocene *Neoguraleus*. *Vexiguraleus* appears to represent a line directly ancestral to *Fusiguraleus* and possibly a development from a smooth apiced forerunner, connecting with true *Guraleus*, which is so well represented, Tertiary and Recent, in Australia, but not so far discovered in New Zealand. Sculptural progress of the *Vexiguraleus* apex by the development of axials and the spirals, already represented faintly on the last half-whorl, would appear then to leave no point of distinction between that genus and *Fusiguraleus*. However, no such transition is known to occur, so *Vexiguraleus* must be regarded as distinct from the long lines of fenestrate apiced (*Fusiguraleus*) and *Neoguraleus* (s. str.). Even with the hypothetical fenestration of the *Vexiguraleus* nucleus by the development of spirals, the axials also, would have to lose their forward concave trend and become upright and stronger, before identity could be claimed.

Vexiguraleus clifdenensis n. sp. Pl. 5, fig. 2.

Shell small, fusiform, whorls slightly angled at upper two thirds, 6, including 4-whorled protoconch as described above (holotype not fully grown). Spire less than height of aperture plus canal. Post-nuclear sculpture of strong, broadly rounded, arcuate axials, extending over base to neck; on the shoulder they are much weaker, narrower, and shallowly concave, following the sinus outline. The axials number twelve on the last whorl. Three primary spirals on spire whorls, uppermost at angle, a fourth just below lower suture on body-whorl, but none much stronger than the linear-spaced secondary spirals, which are strongest on the body-whorl and neck, but again become weak towards the end of the canal. Fasciole not defined. The shoulder has subobsolete fine spirals, too indistinct to be counted. Aperture narrow, canal moderately long. Outer lip not mature in holotype, but evidently simple and not thickened.

Height, 5.2 mm.; diameter, 2.3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (6b, type) Southland (Hutchinsonian) Lower Miocene.

There is a closely allied species with identical apex from Clifden (7a) and (7c) (Awamoan) but the material is not good enough for description.

Genus **Antiguraleus** n. gen.

Type: *A. otagoensis* n. sp. Recent, N.Z.

This is another deceptive group, having the same general form and subsutural weak sinus, occupying the shoulder, as in both *Guraleus* and *Neoguraleus,* but an entirely different style of nucleus. The protoconch is paucispiral, asymmetrical, of 1½ whorls, papillate, the tip adpressed and not well marked, but thence suddenly and rapidly inflated; more bulging on one side; everywhere smooth and glossy; no brephic stage. The range is (Urenuian) Upper Miocene to Recent, the majority of the species being Recent, all from moderately deep water. So far as is known, the genus is restricted to New Zealand, but there is an allied new genus in the Australian Tertiary.

Key to Species of Antiguraleus.

A. Whorls sharply angled.
- Angle median.
  - Axials 13 per whorl .... *otagoensis* n. sp.
  - Axials 16 per whorl .... *mundus* (Suter)
- Angle just above middle.
  - Axials 14-15 per whorl, weak, lamellate .... *murrheus* (Webster)
- Angle at two thirds whorl height.
  - Axials 12-14 per whorl, very broad .... **taranakiensis* (Marwick).
  - Axials 14-15 per whorl, very narrow .... **deceptus* n. sp.
- Angle at three-fourths whorl height.
  - Axials 9-11 per whorl, very broad .... **abnormis* (Hutton)

B. Whorls slightly angled.
- Two primary spirals on spire whorls.
  - Axials 9 per whorl .... *infandus* (Webster)
  - Axials 12 per whorl .... *subtruncatus* n. sp.
- Three primary spirals on spire whorls.
  - Axials 16 per whorl .... *fenestratus* n. sp.

C. Whorls rounded. Base gradually contracted.
- Axials 13 per whorl.
  - Primary spirals 3-4 on spire whorls .... *rossianus* n. sp.
- Axials 14-16 per whorl.
  - Primary spirals 3 on spire whorls .... *pedicus* n. sp.

Antiguraleus taranakiensis (Marwick, 1926).

1926 *Mangilia taranakiensis* Marwick, Trans. N.Z. Inst., vol. 56, p. 325, Pl. 74, fig. 5.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1134, Papatiki Stream, North Taranaki (Urenuian) Upper Miocene.

Antiguraleus abnormis (Hutton, 1885). Pl. 8, fig. 2.

1885 *Clathurella abnormis* Hutton, Trans. N.Z. Inst., vol. 17, p. 316.

Holotype in Canterbury Museum, Christchurch.

Locality: Petane, Hawke's Bay (Nukumaruan) Middle Pliocene.

Antiguraleus deceptus n. sp. Pl. 8, fig. 7.

Shell small, fusiform, comparatively broad; whorls sharply angled and keeled at upper two thirds. Spire a little taller than aperture plus canal. Base quickly contracted, canal moderately long, broadly open. Whorls 5½, including protoconch, which is rather narrower and taller than in typical species. Axials rather narrow, fairly prominent, 14-15 per whorl and weakly persistent over base. Spiral sculpture of narrow, rounded, primary cords and subsidiary fine threads, both series crossing the axials. Six fine threads on the slightly concave shoulder, and four equispaced primary cords on spire

whorls; lowest just half emergent at suture. Four additional wide spaced spirals on the base, and below, 15 weaker linear-spaced, rounded, spiral threads on the neck and fasciole. The primary spirals have a subsidiary spiral thread in each interspace.

Height, 6.1 mm.; diameter, 3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Petane, Hawke's Bay; Devil's Elbow, Napier-Wairoa Road (Nukumaruan) Middle Pliocene.

Antiguraleus mundus (Suter, 1909).

1909 *Mangilia munda* Suter, 1909, Rec. Cant. Mus., vol. 1, no. 2, p. 129, Pl. 12, fig. 6

Holotype in Canterbury Museum, Christchurch.

Locality: 20 miles N.E. of Flat Point in 105 fathoms, North Id.

Antiguraleus murrheus (Webster, 1906).

1906 *Mangilia murrhea* Webster, Trans. N.Z. Inst. 38, p. 305, Pl. 38, figs. 1, 1a.

Locality: 110 fathoms off Great Barrier Id.

The tip of the canal is missing in Webster's holotype; a topotype shows the canal to be slightly longer.

Antiguraleus infandus (Webster, 1906).

1906 *Mangilia infanda* Webster, Trans. N.Z. Inst. 38, p. 305, Pl. 38, f. 2

Holotype in Dominion Museum Wellington.

Locality: 110 fathoms off Great Barrier Island.

The type is worn, with the initial whorl of the protoconch missing and the outer lip broken away. Webster (l.c.) described the protoconch (evidently from other material) as of "about one whorl and a half." The sinus, as shown by earlier growth stages in the holotype, is shallow and concave, occupying the shoulder. These two features, as well as the general facies of the shell, have decided its reference here to *Antiguraleus*.

Antiguraleus subtruncatus n. sp. Pl. 8, fig. 1.

Shell small, white, fusiform, weakly angled above the middle of the whorls. Spire 1½ times height of aperture plus canal. Base very quickly contracted, canal short, broadly open. Whorls 5½, including protoconch. Axials bluntly rounded, with subequal interspaces, 12 per whorl. Spiral sculpture fine and crisp, crossing axials. Two main spirals on upper whorls, increased by intermediates to four by penultimate; a further five wide spaced spirals on the base, and finally, about eight fine, rather indistinct, linear-spaced spiral threads on the fasciole.

Height, 6.8 mm.; diameter, 3.2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: 50 fathoms off Oamaru.

Antiguraleus otagoensis n. sp. Pl. 8, fig. 4.

Shell small, white fusiform, sharply carinated about middle of whorls. Spire same height as aperture plus canal. Base fairly quickly but regularly contracted, canal moderately long, broadly open. Whorls 5½, including protoconch. Axials rather narrowly rounded, distant, persistent, but weaker over base, 13 per whorl. Spiral sculpture crisp, moderately strong, crossing the axials, developed below the keel and on the base. Above the keel the shoulder bears six fine spiral threads. Below, including the one forming the

keel there are three main spiral flat-topped cords on the spire whorls. On the base there are seven wider spaced, primary cords, and finally seven much finer linear-spaced spiral threads on the fasciole.

Height, 6 mm.; diameter, 3 mm.; (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: 50 fathoms off Oamaru.

Antiguraleus fenestratus n. sp. Pl. 8, fig. 6.

Shell small, buff, fusiform, weakly subangled just above the middle of whorls. Spire 1½ times height of aperture plus canal. Base quickly contracted, canal rather short, broadly open. Whorls 5¼, including protoconch. Sculpture fenestrate. Axials rather thin, 16 per whorl. Spiral sculpture consisting of from two to four fine threads on the shoulder of spire whorls, and three moderately strong, sharply raised cords, from the angle downwards, and about thirteen on the base, undifferentiated over neck and fasciole, except that they become regularly weaker and more closely spaced below.

Height, 5.4 mm.; diameter, 2.3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: 60 fathoms off Poor Knights Islands.

Antiguraleus rossianus n. sp. Pl. 8, fig. 3.

Shell small, white, narrowly fusiform, whorls rounded. Spire tall, 1.6 times height of aperture plus canal. Base gradually contracted, canal moderate, obliquely flexed. Whorls 4½, including a typical, but disproportionately large and more bulbous protoconch of 1½ whorls. Sculpture fenestrate, axials thin, 13 per whorl, obsolete over base. Seven, spaced, flat-topped, sharply raised, spiral cords on spire whorls; three of moderate strength above the middle and four stronger ones below. On the base there are eight weak, close-spaced spirals on the neck and fasciole.

Height, 4.3 mm.; diameter, 1.8 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: 95 fathoms off Auckland Islands.

Antiguraleus pedicus n. sp. Pl. 8, fig. 5.

Shell small, white, narrowly fusiform, whorls rounded. Spire 1.15 times height of aperture plus canal. Base very gradually contracted. Canal moderately long, broadly open. Whorls 5, including protoconch . Sculpture weak, axials stronger than spirals. Axials 14-16 per whorl, narrowly rounded. Four regular, close-spaced, weak spirals above the middle on spire whorls and 3 stronger spaced spirals below; on the base there are six, spaced, spiral cords, merging below with about 12 linear-spaced threads which become indistinct over the fasciole. Fine linear-spaced spiral threads occupy the spaces between the primary cords.

Height, 5.7 mm.; diameter, 2.3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: 50 fathoms off Snares Islands (Holotype); 50 fathoms 10 miles E.N.E. of Otago Heads.

Genus **Liracraea** Odhner, 1924.

Type (o.d.): *Clathurella epentroma* Murdoch, Recent, N.Z.

These are narrow *Guraleus*-like shells with attenuate spire, truncated anterior canal, broad shallow sinus on the shoulder and a most distinctive protoconch which is moderately large, paucispiral, loosely coiled, and sculptured with a few strong spiral keels. The genus is known only from New Zealand; Nukumaruan (mid-Pliocene) to Recent.

Key to Species of Liracraea.

A. Shell narrow.
  Primary spirals 3 per whorl.
    Whorls very slender and loosely coiled.
      Axials 9 on body-whorl .... *subantarctica* n. sp.
    Whorls narrow but compact.
      Axials 15-16 on body-whorl .... *epentroma* (Murdoch)
  Primary spirals 4 per whorl.
      Axials 12 on body-whorl. Keels on protoconch less prominent, tip papillate .. *otakauica* n. sp.

B. Shell wider; whorls angulate.
  Primary spirals 3 per whorl.
      Axials 14 on body-whorl, broadly rounded .... *whangaroaensis* (Murdoch)
      Axials 11-12 on body-whorl, narrow and sharp .... **dictyota* (Hutton)
  Primary spirals 2 per whorl.
      Axials 14 on body-whorl, broadly rounded, shell relatively large; pale buff, pillar stained with purplish-brown .... *odhneri* n. sp.
      Axials 13 on body-whorl, strong. Spire short .... *titirangiensis* (Marwick)

Liracraea epentroma (Murdoch, 1905).

1905 *Clathurella epentroma* Murdoch, Trans. N.Z. Inst. 37, p. 219, Pl. 7, figs. 3, 4.

Holotype in Dominion Museum, Wellington.

Localities: Whangaroa Harbour (type); Bluff; Paterson Inlet, 13 fath., Stewart Island; 60 fath. off Otago Heads.

Liracraea otakauica n. sp. Pl. 5, fig. 5.

Shell of similar shape and appearance to *epentroma*, but larger, pure white, with four primary spiral ribs, and modifications in the details of the protoconch. The latter is paucispiral and similarly shaped, but the four spiral cords are weaker and rather late in developing, so that the initial whorl is rounded and papillate, not tabulated. Spire almost 1½ times height of aperture. Axials broadly rounded and strong, 12 on the body-whorl. Four primary spirals on spire whorls and close-spaced, moderately strong, subsidiary spirals in the interspaces. The four spirals result from the strengthening of an intermediate between the uppermost spiral and spiral 2, and another between 2 and the lower suture. No. 3 is immersed by the succeeding whorl.

Height, 7.8 mm.; diameter, 2.75 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: 60 fathoms off Otago Heads.

Liracraea subantarctica n. sp. Pl. 5, fig. 6.

Differs from all other species of the genus in being extremely narrow, elongated and loosely wound; axials more distant, stronger; primary spirals strong, and subsidiary spiral striae weak. Whorls six, including a typical paucispiral protoconch, sculptured with three strong spiral keels. Spire 1½ times height of aperture. Anterior canal short, broad ,shallowly notched. Aperture ovate. Post-nuclear sculpture of broadly rounded, rather distant, strong axials reaching from suture to suture, nine on body-whorl. Primary spirals strong, but weaker than axials, which they cross, causing weak nodulation. Three primary spirals per whorl, uppermost just below upper two-thirds, lowest just above lower suture. Three distant main spirals on base. Subsidiary sculpture consisting of fine close-spaced spiral striae. Colour light reddish-brown.

Height, 7.1 mm.; diameter, 2.5 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.

Localities: Bounty Islands in 50 fathoms (type); Faith Harbour, Auckland Islands.

Liracraea titirangiensis Marwick, 1928.

1928 *Liracraea titirangiensis* Marwick, Trans. N.Z. Inst. 58, pp. 491, 506, f. 137.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: Titirangi, Chatham Islands (Nukumaruan) Middle Pliocene.

Liracraea whangaroaensis (Murdoch, 1905).

1905 *Clathurella epentroma whangaroaensis* Murdoch, Trans. N.Z. Inst. 37, p. 219, Pl. 7, f. 5.

Holotype in Dominion Museum, Wellington.
Locality: Whangaroa Harbour (type); 40 fath. E. of Papanui Inlet, Otago.

Liracraea dictyota (Hutton, 1885).

1885 *Clathurella dictyota* Hutton, Trans. N.Z. Inst. 17, p. 316, Pl. 18, f. 8.

Holotype in Canterbury Museum, Christchurch.
Localities: Petane (type) and Inner Harbour, Napier (sands above blue clay), Hawke's Bay; N.Z. G.S. loc. 1164, Nukumaru (Nukumaruan) Middle Pliocene.

Liracraea odhneri n. sp. Pl. 5, fig. 4.

This, the largest species of the genus so far known, is the Recent descendant of the mid-Pliocene *dictyota*. That species has narrow, sharply raised spirals and axials, producing an open fenestrate effect. The Recent species is wider, with the axials more bluntly rounded, 12 on the body-whorl, and the primary spirals reduced to two, the third being immersed by the succeeding whorl. Secondary spirals close-spaced, fine but distinct. Colour pale-buff. Pillar and fasciole tinged with purplish-brown, and two similarly coloured faint bands within the aperture.

Height, 7.8 mm.; diameter, 3.2 mm. (Holotype).

Holotype in writer's collection, Auckland Museum.
Localities: Tryphena Bay, 6 fath., Great Barrier Id. (type); Foveaux Strait, 15 fath.; Lyall Bay, Wellington.

Genus **Etrema** Hedley, 1918.

Type (o.d.): *Mangilia (Glyphostoma) aliciae* Melvill & Standen. Recent, Loyalty Is.

Etrema is a widely distributed Indo-Pacific genus occurring also in the Upper Tertiary of Victoria and South Australia. It is distantly allied to the West Indian Miocene-Recent *Glyphostoma* and more closely to *Etremopsis*, a new genus described herein for a series of New Zealand Tertiary species. The Austro-Pacific *Lienardia*, *Thetidos* and *Acrista* are related also.

The differentiation of these genera is expressed by the key on page 35, *Etrema* being readily distinguished from *Etremopsis* by its fewer whorled protoconch, and the addition of columellar denticles as well as those on the inside of the labial varix.

Etrema is represented in the New Zealand Tertiary by a new species from Pakaurangi Point, Kaipara (Hutchinsonian). *Mangilia hedleyi* Oliver, 1915. 10-30 metres, Sunday Id., Kermadec Is., is an *Etrema* also, but *Glyphostoma roseocincta* Oliver from the same location is a *Lienardia*.

Etrema kaipara n. sp. Pl. 10, fig. 3.

Shell of moderate size, fusiform. Spire slightly taller than height of aperture plus canal. Whorls $4\frac{1}{2}$, exclusive of protoconch, which is incomplete, but evidently of about three smooth whorls, the last keeled. Whorls angled above middle, more strongly on body-whorl. Base quickly contracted to a long straight neck. Axials broadly rounded, slightly oblique, extending from upper suture to neck, 13 on body-whorl. Spire whorls

with two primary sharply raised spiral cords and three secondary ones, one above upper primary, one between the primaries, and the third just above lower suture. Four weak spiral threads on shoulder. On the body-whorl, base and neck, there are 22 spirals, closer spaced on neck but relatively strong. Aperture narrow, oblique. Outer lip heavily variced but thin on the inner edge. Sinus occupying shoulder, deep and rounded, rendered subtubular by a thick entering parietal callosity, bearing a strong tubercle. Columella with four rather distant strong tubercles. Inner edge of outer lip bearing six tubercles arranged in pairs on three prominently raised callus patches. Anterior canal moderately long, narrow and slightly oblique.

Height, 6.7 mm.; diameter, 3 mm.

Holotype and damaged paratype in collection of Dr. C. R. Laws, Auckland.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Genus **Etremopsis** n. gen.

Type: *Drillia imperfecta* Suter, 1917 (Awamoan) Middle Miocene, N.Z.

This is a New Zealand lower Tertiary group closely resembling *Etrema* in adult features, but with a polygyrate 6-whorled protoconch, as compared with only 2½-3½ whorls in *Etrema*.

The protoconch in *Etrema* has a small smooth helicoid tip of 1½ whorls, followed by 1 to 2 whorls with a sharp peripheral keel. In *Etremopsis* the protoconch is sharply conical, the first four whorls smooth, with convex sides, the tip minutely globular and adpressed; all remaining whorls with a very sharp and strong medial carina. A sharp thread margins the lower suture on all whorls. Shoulder glossy, appearing smooth, but actually minutely punctate. All whorls with dense vertical hair-threads between keel and lower suture, but subobsolete on last whorl. Last half-whorl with prominent axial sculpture also, beginning as fine, very distant, beautifully curved sharp ridges extending from upper suture to shoulder, serrating keel but not at first extending below it; after ¼ whorl they rather suddenly slant more obliquely forward and reach almost to the lower suture, but leave a small, smooth, concave space just above the sutural thread; at the same time a second much weaker keel develops just below the peripheral one. At the termination of the protoconch, marked by the sudden cessation of the sutural thread, there is a ¼ whorl of brephic stage in which the axials become stouter and the lower keel grows to greater prominence that the peripheral one.

The adult shell is almost identical with *Etrema*, having a deeply excavated sutural notch, inflected outer lip, short open canal and a moderate tubercle on the parietal callus opposite the sinus, as well as moderate entering plications on the inside of the outer lip, but never any tubercles or plications on the columella as normally occurs in *Etrema*.

The geological range of the genus is Miocene (Hutchinsonian-Awamoan).

Key to Species of Etremopsis.

Axials prominent, reaching fasciole.
  Aperture squarish, canal truncated.
    Whorls rounded. Axials 10 on penultimate.
      Base little contracted .... *carinapex n. sp.
    Whorls shouldered. Axials 9 on penultimate.
      Base contracted .... *imperfecta (Suter)
Axials less prominent, not reaching fasciole.
  Spiral cords of equal development.
    Whorls rounded. Axials 13 on penultimate........ *aequisculpta n. sp.
  Spiral cords unequal, 2-3 stronger on spire.
    Whorls shouldered.
      Body-whorl sharply keeled. Axials tubercular.

Shell squat.
Axials vertical ,10 on body-whorl .... *clifdenica n. sp.
Shell elate.
Axials oblique, weak, 9 on body-whorl .... *elata n. sp.
Axials vertical, 12 on body-whorl (axials weaker and spirals stronger than in *clifdenica)* .... *compta n. sp.
Body-whorl bluntly shouldered. Axials not tubercular.
Protoconch narrow and elate.
Shell moderately inflated.
Two strong main cords on spire .... *oamarutica n. sp.
Four main cords on spire................................ *quadrispiralis n. sp.
Shell narrow and elate
Three weak cords on spire..................................... *haroldi n. sp.
Protoconch relatively broad.
Axials broad, distant, stout and erect, 9-10 per whorl .... *erecta n. sp.
Axials narrow, rather flexuous, weaker, 13-14 per whorl .... *latiapex n. sp.

Etremopsis clifdenica n. sp. Pl. 9, fig. 9.

Shell small, squat. Whorls sharply angled at about the middle. Base rather rapidly contracted. Whorls 8, including typical 6-whorled protoconch. Post-nuclear spire-whorls with distant, broad, prominent, but narrowly arched axials rapidly fading away on base, 10 per whorl. Shell crossed by spiral striae and narrow, crisp spiral cords. Four equi-spaced cords on spire whorls, the angle, occurring at the second cord from the top. Between uppermost cord and upper suture there are seven close-spaced spiral threads. On the body-whorl, including base, neck and fasciole, there are about 22 cords, with an occasional intermediate thread. Cords on the fasciole are more closely spaced. The second cord on the spire, at the angulation, is rendered slightly tubercular as it crosses the narrowly arched axials. Spire very slightly taller than aperture plus canal. Outer lip undeveloped in holotype.

Height, 4.4 mm.; diameter, 2.2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Clifden (6c, type) (Hutchinsonian) Lower Miocene, and Clifden (8a), Southland (Awamoan) Middle Miocene.

Etremopsis compta n. sp. Pl. 9, fig. 10.

Shell rather small, narrowly fusiform, elate. Whorls angled just above middle, nine in number, including typical six-whorled protoconch (tip missing in holotype). Spire one and one sixth height of aperture plus canal. Post-nuclear spire-whorls with fairly strong, narrowly arched axials, reaching upper suture, but fading out on base above the neck, twelve on body-whorl. Two narrow but prominent spiral keels on spire whorls, rendering the axials weakly spinose at points of intersection, uppermost at angle; a third partly shows as a margining of the lower suture. Sixteen further strong, crisp spirals on base, neck and fasciole. There is an occasional weak intermediate between the primary spirals of the body-whorl, but otherwise the interspaces are smooth. The shoulder, however, bears five fine but distinct spiral lirae. The aperture is narrow, with parallel sides, the outer-lip heavily variced and lirate within, the sinus abnormally wide and rather deep, and the canal moderately long and almost straight. There is a strong parietal tubercle opposite the sinus.

Height, 5.5 mm.; diameter, 2.4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Clifden (East Side B) Southland (Hutchinsonian) Lower Miocene.

Etremopsis erecta n. sp. Pl. 9, fig. 7.

Species closely resembling *quadrispiralis,* having a broader protoconch of five whorls, but otherwise typical; the fourth primary spiral cord commences earlier, on the second

post-nuclear whorl; there are only 9-10 axials per whorl; the outer-lip is lirate within, and the spirals on base, neck and fasciole are more numerous (22), finer and more closely spaced.

Height, 6.4 mm.; diameter, 2.7 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (6c) Southland (Hutchinsonian) Lower Miocene.

Etremopsis imperfecta (Suter, 1917).

1917 *Drillia imperfecta* Suter, N.Z. Geol. Surv. Pal. Bull. No. 5, p. 49, Pl. 1, fig. 10.

Holotype in Otago University Museum, Dunedin.
Locality: Shell-bed, Target Gully, Oamaru (Awamoan) Middle Miocene.

Etremopsis carinapex n. sp. Pl. 9, fig. 6.

Shell small, narrow, elongate. Whorls rounded, body-whorl long, very little contracted. Spire slightly taller than aperture plus canal. Whorls 8, including typical protoconch of six whorls, as already described. Post-nuclear spire-whorls with four equispaced, moderately strong, but narrow, spiral cords, and two weak spiral threads between uppermost cord and suture. On the base there are ten more spiral cords, five of which are on the rather prominent bulging fasciole. Axials strong, rounded, distant, extending right to the fasciole, 10 on the penultimate. The spirals cross all the axials, are there undiminished in strength, but are not rendered tubercular.

Height, 4 mm.; diameter, 1.65 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Pukeuri, Oamaru (Awamoan) Middle Miocene.

The sole example has the outer lip undeveloped.

Etremopsis aequisculpta n. sp. Pl. 9, fig. 3.

Shell of moderate size, compact, fusiform. Whorls broadly rounded except for a weak subsutural concavity. Base gradually and evenly contracted. Spire slightly taller than aperture plus canal. Whorls 9, including typical six-whorled protoconch (initial 3 whorls missing in holotype). Post-nuclear spire-whorls with regular broadly rounded axials not reaching the fasciole, 13 on the penultimate. The whole shell crossed by one series of close spaced rounded spiral threads more prominent in the interspaces of the axials. Ten spirals on the spire-whorls and about 24 on body-whorl, with a further 9, slightly stronger, on the neck and fasciole. Aperture narrow with a deep rounded subsutural sinus and an open canal of moderate length. Outer lip slightly variced, with 18 weak entering lamellae on the inside. The inner lip is smooth except for a weak parietal tubercle opposite the sinus.

Height, 7 mm.; diameter, 3.1 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Target Gully, Oamaru (type) and Pukeuri, near Oamaru (Awamoan) Middle Miocene.

Etremopsis elata n. sp. Pl. 9, fig. 8.

Shell rather small, narrowly fusiform, elate. Whorls angled medially, shoulder sharply descending, base little contracted. Spire taller than aperture plus canal. Whorls 9, including typical 6-whorled protoconch. Axials distant, weak, oblique, obsolete on base, 9 on body-whorl. Spiral sculpture of 4-5 weak threads on the shoulder and four primary narrow cords below, uppermost just above the angulation, lowest at lower suture; intermediate fine threads occur. On the base there are twelve close-spaced slightly stronger rounded cords, merging with a further six slightly weaker cords on the fasciole. Aper-

ture narrow with a deep, broadly rounded, subsutural sinus and an oblique, rather open, moderately long canal. There is a weak parietal tubercle, and the outer lip is slightly variced but without entering lamellae within.

Height, 5.1 mm.; diameter, 2.15 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Pukeuri, near Oamaru (Awamoan) Middle Miocene.

Etremopsis oamarutica n. sp. Pl. 9, fig. 2.

Shell rather small, fusiform, moderately wide medially. Whorls angled above the middle, 8½, including typical narrow six-whorled protoconch (tip missing in holotype). Spire one and a fifth height of aperture plus canal. Post-nuclear whorls with heavy, broadly rounded axials, 12 on body-whorl, crossed by two conspicuous primary spiral cords on spire whorls, uppermost forming the angle. On the base there is a third primary proceding from the lower suture, followed by a further six on the base, and about ten less distinct on neck and fasciole. Subsidiary spiral sculpture consists of five threads on the shoulder. The aperture is narrow, with parallel sides; the outer-lip strongly variced but thin and incurved at extreme edge, and weakly lirate within. Sinus wide and deep.

Height, 5.9 mm.; diameter, 2.5 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Ardgowan, near Oamaru (Awamoan) Middle Miocene.

Etremopsis haroldi n. sp. Pl. 9, fig. 4.

Shell slender, narrowly fusiform. Whorls slightly convex, not angled, 8½, including narrow typical protoconch (tip missing in holotype). Spire one and a fifth height of aperture plus canal. Post -nuclear whorls with heavy, broadly rounded axials, 12 on body-whorl, crossed by three primary spiral cords on spire-whorls, lowest just above lower suture; about 18 linear-spaced spirals on base, neck and fasciole. Aperture narrow, with parallel sides, very weakly lirate within outer lip. The species is allied to *oamarutica*, but is constantly much narrower, the whorls are not angled and there are three primary cords on the spire-whorls.

Height, 6 mm.; diameter, 2.2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Ardgowan, near Oamaru (Awamoan) Middle Miocene.

Etremopsis quadrispiralis n. sp. Pl. 9, fig. 1.

Shell rather large, fusiform, but wide medially. Whorls angled at upper two thirds, 9, including typical narrow six-whorled protoconch. Spire one and a fifth height of aperture plus canal. Post-nuclear whorls with broad heavy rounded axials, 11 on body-whorl, crossed by three main primary spiral cords on first two adult whorls, increased to four on penultimate and body-whorl. Seventeen spaced strong cords on base, neck and fasciole. Six subsidiary spiral threads on shoulder and an odd intermediate between main cords on body-whorl. Aperture moderate, not lirate within, but otherwise typical.

Height, 8 mm.; diameter, 3.4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Locality: Dyer's Run, Lower Waihao Valley, South Canterbury (Awamoan) Middle Miocene.

Etremopsis latiapex n. sp. Pl. 9, fig. 5.

Shell resembling *erecta* in having a broad protoconch of 5 whorls, but different in having thinner and more numerous axials, 13-14 per whorl. Four main spirals on all

post-nuclear whorls, plus 23 on base, neck and fasciole; six subsidiary threads on shoulder. Whorls 7½, including protoconch. Shell moderately broad. Spire one and a fifth height of aperture. Outer lip heavily variced, distinctly lirate within.

Height, 6 mm.; diameter, 2.8 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Pukeuri, near Oamaru (type); Clifden (8a) Southland (Awamoan) Middle Miocene.

Genus **Anacithara** Hedley, 1922.

Type (o.d.): *Mangilia naufraga* Hedley. Recent, Queensland.

This genus was proposed for a group of Queensland Recent species resembling *Eucithara* (= *Cythara* auct.) in their upper whorls and sculpture, but differing in their wide aperture, devoid of teeth on either side. The protoconch is rather small, smooth, bluntly rounded, of two whorls, usually followed by a brephic stage of curved axials. Five species from the Hutchinsonian and Awamoan (Lower and Middle Miocene) of New Zealand are here referred to this genus. The protoconch in these differs somewhat from that of the genotype in having three whorls, and in being more dome-shaped, but it is followed by the characteristic brephic stage of curved axials. In all other respects, the New Zealand fossils compare well with the Queensland genus. It is worthy of note that a new Tasmanian Tertiary species (Janjukian) has a protoconch exactly as in the New Zealand members.

Key to Species of Anacithara.

Protoconch dome-shaped of 3 smooth whorls.

1. Axials 11 on body-whorl, weakly nodulose at angle. Shell small, narrow. Spiral sculpture subobsolete on spire whorls .... **clifdenica* n. sp.
2. Axials 9 on body-whorl. Shell small, broader, previous labial varix retained. Spiral striae exceedingly fine .... **finlayi* n. sp.
3. Axials 10 on body-whorl. Shell small, ovate, scarcely angulate. Spiral lirae moderately strong .... **nana* n. sp.
4. Axials 18 on body-whorl Shell larger, narrowly fusiform. Axials retractive above angulation, protractive below .... **errabunda* n. sp.

Protoconch more narrowly conical, 3 smooth whorls.

5. Axials 10 on body-whorl; dense surface striations .... **axialis* (Marshall)

Anacithara clifdenica n. sp. Pl. 5, fig. 8.

Shell small, fusiform. Whorls 7 (6 in holotype, which is not adult), including a dome-shaped smooth protoconch of 3 whorls, tip minute, helicoid and central, followed by a short brephic stage of rather stout close axials. Spire 1.3 times height of aperture, whorls distinctly angled just above the middle. Sculpture consisting of prominent broadly rounded axials, slightly reduced on shoulder, weakly nodulose at angle, and rapidly fading out over base, 11 on body-whorl. Spiral sculpture subobsolete on spire-whorls, but moderately strong on lower part of base and neck. Aperture ovate, unarmed, but outer-lip strengthened externally by a strong fold-like varix. Sinus on shoulder broad and shallow. Anterior canal short, broadly open and very shallowly notched.

Height, 4.9 mm.; diameter, 2.3 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).

Localities: Clifden (4b, type, 6a and 6b) Southland (Hutchinsonian) Lower Miocene.

In the holotype the protoconch appears abnormally large for the genus, but the specimen is not fully grown.

Anacithara errabunda n. sp. Pl. 5, fig. 10.

Shell more narrowly fusiform, taller spire, almost 1½ times height of aperture, angle becoming obsolete over body-whorl, axials weaker and more numerous, 18 on body-whorl, extending from suture to suture on spire-whorls, and half way over base. Trend of axials altered at angle, slightly retractive above, and slightly protractive below, weakly tubercular at angle on early whorls. Surface crowded with fine but distinct spiral striations, strongest on base and neck. Whorls 8, including smooth dome-shaped protoconch of 3 whorls followed by a half-whorl of close stout axials. Aperture, unarmed, strengthened externally by a strong varix. Sinus and anterior canal typical.

Height, 8.7 mm.; diameter, 3.5 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden, Southland (East side A (Hutchinsonian) Lower Miocene.

Anacithara axialis (Marshall, 1918). Pl. 5, fig. 9.

1918 *Mangilia axialis* Marshall, Trans. N.Z. Inst. 50, p. 269.

The species has the characteristic *Anacithara* unarmed aperture and heavily variced outer lip. The three-whorled smooth protoconch is more narrowly conical than in the other New Zealand species, but not sufficiently distinct to warrant separation. The post-nuclear sculpture is of fairly prominent rounded axials, 10 on body-whorl, and dense surface striations. For some unknown reason, Marshall figured one of the imperfect paratypes. A figure of the well preserved holotype is here provided.

Height, 6.4 mm.; diameter 2.8 mm. (Holotype).

Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Anacithara nana n. sp. Pl. 5, fig. 11.

Shell quite small, robust, ovate. Spire equal to height of aperture plus canal. Whorls strongly convex, with merest suspicion of a median angulation. Base slowly and evenly contracted. Axials massive, broadly rounded, 10 on body-whorl. Whorls 6, including smooth dome-shaped protoconch of 3 whorls. Spiral sculpture of dense, linear-spaced, moderately strong lirae, strongest over base and neck. Aperture ovate, outer lip heavily variced externally but unarmed as in the other species. There is a slight entering parietal callus, but no tubercle. Sinus broad and shallow occupying the poorly defined, rather broad shoulder.

Height, 4.65 mm.; diameter, 2.27 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (7a) Southland (Awamoan) Middle Miocene.

Anacithara finlayi n. sp. Pl. 5, fig. 7.

Shell small, nearest to *clifdenica,* but with fewer and stronger axials and a less acute angulation. In addition to the strong terminal labial varix, the previous one remains on the front left of the body-whorl, or two thirds of a whorl back from the terminal varix. This gives a trigonal cross section to the whorls. Whorls 6, including smooth dome-shaped protoconch of 3 whorls, followed by the usual half whorl of strong brephic axials. Surface appearing smooth and polished, but actually crowded with exceedingly fine striations. Neck and lower part of base with moderately strong spiral threads. Spire a little taller than aperture plus canal. Nine axials on body-whorl. Details of aperture normal.

Height, 4.35 mm.; diameter, 2.3 mm.; (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Clifden (7c) Southland (Awamoan) Middle Miocene.

Although the species is very small and has only three post-nuclear whorls, it is evidently adult, as shown by the massive labial varix.

Genus **Heterocithara** Hedley, 1922.

Type (o.d.): *Clathurella bilineata* Angas, Recent, New South Wales.

Hedley diagnosed his genus as follows—"a genus of the *Mangiliinae* related to *Paraclathurella.* Shell small, biconical, solid. Numerous perpendicular riblets extend from the suture to the base, and are over-run by smaller spiral cords, between which are dense microscopic hair lines. No fasciole; varix larger than the ribs; sinus small. Within the lip are a series of denticules." The polygyrate broadly conical protoconch has a small smooth tip followed by one whorl minutely punctuate, the remaining whorls being sculptured with strong concave axial threads and a microscopic ground pattern of granulate lirations. This granulate pattern, much strengthened, covers the adult whorls and is a feature characteristic of the *Mangiliinae,* as also is the shallow rounded subsutural sinus. The protoconch is not comparable with that of the *Daphnellinae,* where diagonal cancellation results from two definite transverse elements of the sculpture. The Daphnellid sinus also is quite different, being shaped like the mirror image of a capital "L."

Other typical Australian Recent members are *concinna* Hedley, 1922, and *seriliola* Hedley, 1922, and there are new Tertiary members in the Balcombian and Adelaidean. The genus is represented in New Zealand by a Lower Pliocene and a Recent series.

Heterocithara laterculus Marwick, 1931.

1931 *Heterocithara laterculus* Marwick, N.Z. G.S. Pal. Bull. 13, p. 147, Pl. 16, f. 308.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1325, Ormond Series, Gisborne (Opoitian) Lower Pliocene.

Heterocithara mediocris Odhner, 1924.

1924 *Heterocithara mediocris* Odhner, Pap. Mort. Pac. Expd. N.Z. Moll. 19, Vidensk. Medd. Dansk. Naturn, Foren. 77, p. 43, Pl. 1, f. 29.

Holotype in University Museum, Copenhagen.
Localities: Colville Channel, 35 fath. Hauraki Gulf (type); 38 fath. off Cuvier Island; 60 fathoms off Poor Knights Islands; 25 fathoms Hen & Chickens Islands.

DAPHNELLINAE.

Genus **Daphnella** Hinds, 1844.

Type (s.d. Herrmannsen 1847): *Pleurotoma lymnaeformis* Kiener. Recent, Indian Ocean.

This, the type genus of the subfamily *Daphnellinae,* has a wide Recent range, but there are few species, although the name has been grossly misapplied to cover a heterogeneous collection of species, many of which are not even Turrids. The New Zealand Recent *cancellata* Hutton, 1878, the Australian Recent *D. botanica* Hedley, 1918, and *D. terina* Melvill and Standen, are undoubtedly congeneric with the genotype. The shell is elongate-oval, with the body-whorl occupying more than half the shell height, sculpture delicately reticulated, and the protoconch polygyrate, pointed, and elaborately cancellated by two diagonal series of arcuate thin axials, which intersect the surface into diamond-shaped interspaces. The sinus, which is only moderately deep, occupies the shoulder, descends almost vertically from the suture and is then abruptly angled and produced forwards. The anterior canal is short, broad and open.

Daphnella cancellata Hutton, 1878.

1878 *Daphnella cancellata* Hutton, Journ. de Conch. 26, p. 18.
1915 *Daphnella cancellata* : Suter, Man. N.Z. Moll. (Atlas of Plates), Pl. 46, f. 28.

Holotype in Otago University Museum, Dunedin.
Localities: Auckland Harbour (type); 5 fath. off Crusoe Island, Auckland; Port Fitzroy, Great Barrier Island; Russell, Bay of Islands; Stewart Island (Recorded Suter 1913, p. 508). Recorded from the (Castlecliffian) Up. Pliocene by Marshall & Murdoch 1920, Trans. N.Z. Inst. 52, pp. 120, 122. I have not seen this material.

Genus **Veprecula** Melvill, 1917.

Type (o.d.): *Clathurella sykesii* Melvill & Standen. Recent, Gulf of Oman, 156 fath.

The genus has an exceedingly deep Daphnellid sinus, and a tall, narrow, polygyrate protoconch, sculptured with numerous thin axials and microscopic subsidiary spirals. The crossing of these axial and spiral elements in the protoconch, however, is not comparable with that of true *Daphnella,* where diagonal cancellation of two opposed series of obliquely arcuate, equally developed axials cut the surface into diamond-shaped interspaces. In shape the shell is fusiform, with a rather long canal. The sculpture is clathrate, rendered spinose at the intersections of the axial and spiral ribs. The range of the genus is Persian Gulf to Australia and New Zealand.

Veprecula cooperi Mestayer, 1919.

1919 *Veprecula cooperi* Mestayer, Trans. N.Z. Inst. 51, p. 134, Pl. 8, f. 6.

Localities: 25-30 fath. Hen & Chicken Islands (type); 60 fath. Poor Knights Is.; Discovery II. Stn. 933, 260 metres off Three Kings Islands.

Genus **Nepotilla** Hedley, 1918.

Type (o.d.): *Daphnella bathentoma* Verco. Recent. 104 fath. South Australia.

This group has an exceedingly deep sinus and clathrate sculpture as in *Veprecula,* but a short canal, and a globose, paucispiral, spirally lirate protoconch, having faint traces of very fine, obliquely transverse threads, just noticeable between the spiral lirae. This approximation to reticulation of the protoconch, in conjunction with the deep Daphnellid sinus, decides the position of the genus as in that subfamily.

In New Zealand the genus occurs Recent and in the (Hutchinsonian) Lower Miocene. It is represented in Australia by a number of Recent species, of which *Daphnella bathentoma* Verco, 1909, *Clathurella lamellosa* Sowerby, 1896, and *Daphnella triseriata* Verco, 1909, are typical examples. The apparent absence of the genus from the New Zealand Pliocene is strange, but it may be revealed by more intensive collecting.

Key to N.Z. Species of Nepotilla.

Spire whorls with 2 spiral keels.
Axials 17-19 per whorl .... *vera* Powell

Spire whorls with 3 spiral keels.
Axials 10-12 per whorl ....* *bartrumi* Laws
Axials 11-12 per whorl. Spinose .... *finlayi* Powell

Spire whorls with 4 spiral keels.
Axials 16-18 per whorl .... *nitidula* Powell

Nepotilla bartrumi Laws, 1939.

1939 *Nepotilla bartrumi* Laws, Trans. Roy. Soc. N.Z. 68, p. 500, Pl. 65, f. 45.

Holotype in collection of Dr. C. R. Laws, Auckland.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Nepotilla finlayi Powell, 1937. Pl. 14, fig. 11.

1937 *Nepotilla finlayi* Powell, Discovery Reports 15, p. 217.

Holotype in British Museum (Natural History) London.
Locality: Discovery II. Station 933, 260 metres off Three Kings Islands.

Nepotilla vera Powell, 1940.

1940 *Nepotilla vera* Powell, Trans. Roy. Soc. N.Z. 70, p. 246, Pl. 32, f. 10.

Holotype in Auckland Museum.
Locality: Tom Bowling Bay, Northern N.Z. (in shell sand).

Nepotilla nitidula Powell, 1940.

1940 *Nepotilla nitidula* Powell, Trans. Roy. Soc. N.Z. 70, p. 246, Pl. 32, f. 9.

Holotype in Auckland Museum.

Locality: Tom Bowling Bay, Northern N.Z. (in shell sand).

Genus **Zenepos** Finlay, 1928.

Type (o.d.): *Daphnella totolirata* Suter. Recent, N.Z.

This group is related to *Nepotilla,* having a similar but less exserted protoconch, but the shell is more slender, the sculpture of regular strong spiral cords, and the sinus is even shallower than in either *Stilla* or *Daphnella.* The range of the genus in New Zealand is Upper Pliocene to Recent, and it is represented in Australia by the Recent *Drillia minuta* Tenison-Woods, 1877, and *Daphnella mimica* Sowerby, 1896, both of which Hedley referred to *Nepotilla* (1922, p. 337).

Key to N.Z. Species of Zenepos.

Spire whorls with 3 spiral cords.
- Height 2.8 mm. .... *totolirata* (Suter)
- Height 5 mm. .... **lacunosa* (Hutton)

Spire whorls with 4-5 spiral cords.
- Height 4.5 mm. .... *chariessa* (Suter)

Zenepos lacunosa (Hutton, 1885).

1885 *Daphnella lacunosa* Hutton, Trans. N.Z. Inst. 17, p. 317.

Holotype in Canterbury Museum, Christchurch.

Localities: Wanganui (type); Castlecliff, Wanganui (Castlecliffian) Upper Pliocene.

Zenepos totolirata (Suter, 1908).

1908 *Daphnella totolirata* Suter, Proc. Malac. Soc. 8, p. 189, Pl. 7, f. 23.

Holotype in Wanganui Public Museum.

Locality: 15 fathoms Foveaux Strait (type).

Zenepos chariessa (Suter, 1908).

1908 *Daphnella chariessa* Suter, Trans. N.Z. Inst. 40, p. 351, Pl. 27, f. 9.

Holotype in Wanganui Public Museum.

Locality: 38 fathoms Cuvier Island (type).

Genus **Stilla** Finlay, 1926.

Type (o.d.): *Mangilia flexicostata* Suter. Recent, N.Z.

This is a Daphnellid genus of minute size, so far recognised only from New Zealand. It stands nearest to *Nepotilla,* but the sinus is much shallower, nearer to that of *Daphnella,* and the sculpture is of simple axials. *Nepotilla* and *Veprecula* have an extremely deep sinus and clathrate sculpture, while *Zenepos* has spiral cord-sculpture and an even shallower sinus than *Stilla.*

Key to Species of Stilla.

Axials on body whorl, 15 .... *paucicostata* Powell
Axials on body whorl, 18 .... *flexicostata* (Suter)
Axials on body whorl, 40 .... *delicatula* Powell

Stilla flexicostata (Suter, 1899).

1899 *Mangilia flexicostata* Suter, Trans. N.Z. Inst. 31, p. 73, Pl. 3, figs. 3, 3a.

Holotype in Wanganui Public Museum.

Localities: 15 fath. Foveaux Strait (type); 170 fath. off Puysegur Point, S.W. Otago; 50 fath. Snares Islands; Mason Bay (shell-sand), Stewart Island.

Stilla delicatula Powell, 1927.

1927 *Stilla delicatula* Powell, Rec. Cant. Mus. 3, p. 119, Pl. 21, f. 11.

Holotype in Canterbury Museum, Christchurch.

Localities: 170 fath. off Puysegur Point, S.W. Otago (type) ; 10-17 fath. off Fancy Group, Stewart Id.

Stilla paucicostata Powell, 1937. Pl. 14, fig. 12.

1937 *Stilla paucicostata* Powell, Discovery II. Rep. 15, p. 218, Pl. 56, f. 11.

Holotype in British Museum (Natural History).

Locality: Discovery II. Stn. 933, 260 metres off Three Kings Islands.

Genus **Rugobela** Finlay, 1924.

Type (o.d.): *Ptychatractus tenuiliratus* Suter (Awamoan) Middle Miocene, N.Z.

This is a well defined genus, but its relationship is obscure. It seems to have a greater claim to the *Daphnellinae* than to the *Mangeliinae*, although superficially it more closely resembles the latter. Certainly the apex is decidedly discordant with that of typical *Daphnella* in being perfectly smooth, not diagonally cancellated; but on the other hand the sinus and general apertural characters suggest a Daphnellid in which a weakening of the sinus has resulted in a shallow, broad notch almost vertically descending and with the lip produced abruptly forwards in a broad arc. A characteristic of the genus is the presence of several weak plications near the base of the pillar, and this feature to a lesser extent is found also in true *Daphnella*. In New Zealand the genus ranges from the (Kaiatan) Lower Oligocene to the (Awamoan) Middle Miocene. Finlay (1924, p. 499) has referred to *Rugobela* the Australian Tertiary species, *Cordieria conospira* Tate, 1898, and *Daphnella columbelloides* Ten.-Woods, 1877.

Key to Species of Rugobela.

1. Shell with rounded whorls, densely sculptured with linear-spaced cords.
   - Axials obsolete; a few indistinct ribs on early whorls only.
     - Shell squat, small (5-9 mm.) .... **infelix* (Suter)
     - Shell more elongate, larger (12-16 mm.) .... **canaliculata* (Suter)
   - Axials strong.
     - Axials 12 per whorl, obsolete only on last half whorl .... **tenuilirata* (Suter)
     - Axials 15-16 per whorl, absent from whole of body-whorl .... **semilaevigata* Laws
2. Shell distinctly shouldered.
   - Axials persistent throughout.
     - Axials strong, rather narrow, nodulated at shoulder, 14 per whorl. Spirals moderate **tenuicostata* Laws
     - Axials strong, broadly rounded, nodulated at shoulder, 12-13 per whorl. Spirals very fine **nodulosa* n. sp.
     - Axials strong, broadly rounded, 10 per whorl. Spirals strong and crisp **sepelibilis* (Powell & Bartrum)
     - Axials tubercular on a median peripheral keel, 12-13 per whorl. Spirals not developed on shoulder .... **tersa* (Marwick)
     - Axials obsolete except on early whorls. Axials as strong shoulder nodules, 12 per whorl. Spirals developed on base only .... **humerosa* (Marwick)

Rugobela humerosa (Marwick, 1926).

1926 *Clavatula humerosa* Marwick, Trans. N.Z. Inst. 56, p. 315, Pl. 72, f. 19.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: Lorne, North Otago (Kaiatan) Lower Oligocene.

Rugobela semilaevigata Laws, 1935.

1935 *Rugobela semilaevigata* Laws, Trans. Roy. Soc. N.Z. 65, p. 40, Pl. 7, f. 23.

Holotype in Auckland Museum (Dr. C. R. Laws collection).

Locality: Otiake, Waitaki Valley (Waitakian) Upper Oligocene.

Rugobela sepelibilis (Powell & Bartrum, 1929).

1929 *"Guraleus" sepelibilis* Powell & Bartrum, Trans. N.Z. Inst. 60, p. 441, Pl. 41, figs. 55-58.

Holotype in writer's collection, Auckland Museum.

Locality: Near Oneroa, Waiheke Island, Auckland (Hutchinsonian) Lower Miocene

Rugobela tenuilirata (Suter, 1917).

1917 *Ptychatractus tenuiliratus* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 26, Pl. 7, f. 2.

1921 *Daphnella varicostata* Marshall & Murdoch, Trans. N.Z. Inst. 53, p. 82.

1924 *Rugobela tenuilirata* : Finlay, Trans. N.Z. Inst. 55, p. 499.

Holotype in Otago University Museum, Dunedin.

Localities: Clifden (6a, 6b & 6c) Southland (Hutchinsonian) Lower Miocene; Clifden (7a, 7c & 8a); Target Gully (type); Pukeuri; Ardgowan and Awamoa (type of *varicostata)* (Awamoan) Middle Miocene.

Rugobela tenuicostata Laws, 1935.

1935 *Rugobela tenuicostata* Laws, Trans. Roy. Soc. N.Z. 65, p. 39, Pl. 7, f. 22.

Holotype in Auckland Museum (Dr. C. R. Laws collection).

Locality: Blue Cliffs, South Canterbury (Awamoan) Middle Miocene.

Rugobela nodulosa n. sp. Pl. 11, fig. 11.

Species related to *tenuicostata,* but with stronger, more broadly rounded axials, prominently nodulated at the shoulder angle but only just reaching the lower suture and not extending over the base, 12-13 per whorl. Spirals as fine rounded threads, 2-3 on shoulder and 7-8 from angle to lower suture, linear-spaced and somewhat stronger on lower part of base. Four distinct fine ridges on lower part of pillar. The suture is submargined by a well marked rounded fold.

Height, 12 mm.; diameter, 5.1 mm. (Holotype).

Locality: N.Z. G.S. loc. 2222, sandstone overlying greensand at Campbell's Beach, All Day Bay, Otepopo S.D. (Moeraki) Awamoan) Middle Miocene.

Rugobela canaliculata (Suter, 1917).

1917 *Bela (Buchozia) canaliculata* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 59, Pl. 7, f. 1.

1924 *Rugobela canaliculata* : Finlay, Trans. N.Z. Inst. 55, p. 499.

Holotype in Otago University Museum, Dunedin.

Localities: Target Gully (type), Awamoa, Rifle Butts, Pukeuri and Ardgowan, near Oamaru; White Rock River, Canterbury (Awamoan) Middle Miocene.

Rugobela infelix (Suter, 1917).

1917 *Bela (Buchozia) infelix* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 60, Pl. 12, f. 21.

1924 *Rugobela infelix* : Finlay, Trans. N.Z. Inst. 55, p. 499.

Holotype in N.Z. Geological Survey Office, Wellington.

Localities: White Rock River, Canterbury (type); Target Gully, Awamoa, and Pukeuri, near Oamaru (Awamoan) Middle Miocene.

Rugobela tersa (Marwick, 1931).

1931 *Austrodrillia tersa* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 140, Pl. 16, f. 309.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1242, Tutamoe Series, Gisborne (Awamoan) Middle Miocene.

This species is more strongly sculptured than the typical members of the genus, but the apex and sinus are in accord.

Genus **Asperdaphne** Hedley, 1922.

= *Scabrella* Hedley, 1918. non. Sacco 1890.

Type (o.d.): *Daphnella versivestita* Hedley.

This is a characteristic Recent Australian genus having a blunt, paucispiral protoconch sculptured with spiral ridges and interstitial vertical axials. Hedley (1922, p. 338) does not mention the axials, but states that the nucleus is "spirally grooved instead of being obliquely reticulated." However, authentic topotypic specimens of the genotype, although worn, show these axials quite plainly and the spirals as ridges, not grooves. Although the protoconch does not exhibit the usual Daphnellid diagonal reticulation, reference to the subfamily *Daphnellinae* is indicated by the vertically descending and then angularly produced sinus, adjoining the suture.

Watson's *Pleurotoma (Drillia) ula* from 700 fathoms east of East Cape almost certainly belongs here. I have not seen the species, but Watson describes the protoconch as of "two globose whorls rather remotely microscopically regularly striated." Watson's figure shows a half-grown shell, so accurate determination is difficult.

Asperdaphne ula (Watson, 1881).

1881 *Pleurotoma (Drillia) ula* Watson. Journ. Linn. Soc. 15, p. 420.
1886 *Pleurotoma (Bela) ula* : Watson "Challenger" Zool. 15, Pl. 22, fig. 1.
1913 *Bela ula* : Suter, Man. N.Z. Moll., p. 485.

Holotype in British Museum (Natural History).
Locality: East of East Cape in 700 fathoms.

Asperdaphne aculeata (Webster, 1906).

1906 *Daphnella aculeata* Webster, Trans. N.Z. Inst. 38, p. 306, Pl. 38, f. 4.

Holotype in Dominion Museum, Wellington.
Locality: Off Great Barrier Island in 110 fathoms.

Genus **Maoridaphne** n. gen.

Type: *Daphnella clifdenica* Laws 1939 (Hutchinsonian) Lower Miocene, N.Z.

Thiele (1929, p. 370) synonymised *Cordieria* Monterosato, 1884 (non Rouault, 1848), *Pseudodaphnella* Boettger, 1895, *Kermia* Oliver, 1915, and *Clathurina* Melvill, 1917, under *Philbertia* Monterosato 1884. The type of *Philbertia* has a moderately deep Daphnellid sinus and a small paucispiral protoconch similar to that of *Stilla flexicostata,* but with the interstitial axials stronger on the last whorl, producing reticulation. The protoconch in *Pseudodaphnella philippinensis* Reeve, the genotype, as figured by Hedley (1922, Pl. 55, fig. 185) is similar, but more depressed dome-shaped, with the axials lamellate, and dominating the spirals on the second whorl. That of *Kermia* is paucispiral also, of 2½ whorls, of which the tip is smooth and blunt, then spirally lirate with weak interstitial axial threads; last whorl openly diagonally cancellated, protractive diagonals extending from suture to suture, but the retractive ones do not reach the upper suture, so that reticulation is confined to the lower two-thirds of the whorl. The sinus is moderately deep, and after the formation of the labial varix it does not descend vertically from the suture, being drawn forwards at the suture by the presence of a strong, entering callus pad. The shell is small, cylindrical, with strong, openly reticulated sculpture, and there is a series of denticles within the variced outer lip.

As far as can be judged from Reeve's figure of *Pleurotoma foraminata,* genotype of *Clathurina* Melvill, that genus may well be a synonym of *Philbertia.* Hedley (1922, p. 344) in dealing with Recent Australian Turrids synonymised *Kermia* and *Clathurina* under *Pseudodaphnella,* but on the apical characters as outlined above, *Kermia* is better kept separate from *Pseudodaphnella.* Hedley's (1922) grouping under the latter covers species of true

Kermia also, but study of the protoconchs will be necessary to rearrange all Hedley's species. Certainly *harenula* Hedley, *retellaria* Hedley, and *tessellata* Hinds, figured by Hedley (1922, figs. 181, 189 & 193 respectively) have the *Kermia* apex, but *mayana* Hedley (fig. 182) and *ramsayi* Brazier (fig. 188) seem to accord with *Pseudodaphnella.*

The above new genus, *Maoridaphne,* is proposed for a series of New Zealand Miocene species with a large, polygyrate, sharply conical, reticulated protoconch of 4-6 whorls, the lower whorls being slightly angulate. In general proportions the genus more closely resembles *Philbertia* than either typical *Daphnella* or any of the above discussed genera. However, the *Maoridaphne* protoconch differs considerably from those of the above groups, and the thin-edged, weakly variced outer lip, without denticles, extremely weak sinus, shown only as a faint excavation at the top of the axials, as well as the Cytharoid style of sculpture of distant axials crossed by spiral lirae, effectively separate the genus.

Maoridaphne clifdenica (Laws, 1939).

1939 *Daphnella clifdenica* Laws, Trans. Roy. Soc. N.Z. 68, p. 499, Pl. 63, f. 19.

Holotype in collection of Dr. C. R. Laws, Auckland.
Locality: Clifden, Southland, road-cutting behind racecourse (type, and 6c) (Hutchinsonian) Lower Miocene.

Maoridaphne kaiparica (Laws, 1939).

1939 *Daphnella kaiparica* Laws, Trans. Roy. Soc. N.Z. 68, p. 499, Pl. 63, f. 22.

Holotype in collection of Dr. C. R. Laws, Auckland.
Locality: Pakaurangi Point, Kaipara (Hutchinsonian) Lower Miocene.

Maoridaphne haroldi n. sp. Pl. 4, fig. 7.

This is very similar to *clifdenica,* except that the protoconch is invariably more acutely angulate on the last whorl, and the axials on the body-whorl are more numerous, nine, compared with seven in *clifdenica,* Spiral sculpture, proportions, and other details so similar, that *clifdenica* may definitely be taken as immediately ancestral to *haroldi.*

Height, 5.3 mm; diameter, 2.2 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Target Gully (type); Pukeuri, near Oamaru (Awamoan) Middle Miocene.

The Hutchinsonian *kaiparica* is distinct from the other two species in being more vertically compressed, with stronger and more sharply raised spirals, which are rendered slightly nodulose at the points of intersection. Also, the protoconch has only 4½ whorls, is less sharply conical, and the last whorl is scarcely angled.

Genus **Puha** Marwick, 1931.

Type (o.d.): *Puha fulgida* Marwick (Hutchinsonian) Lower Miocene, N.Z.

This genus was compared with *Vexithara* by its author, mainly on account of the occurrence of weak pillar plications within the aperture. The aperture is also weakly channelled above, but without a definite sinus The protoconch was previously unknown, but a third species of the genus, described below, shows surprisingly that the relationship is with the *Daphnellinae,* for the apex is a perfect five-whorled reticulated "Sinusigera" closely similar to that of *Cryptodaphne* and *Maoridaphne.* The absence of the distinctive Daphnellid reversed "L"-shaped sinus has almost a parallel in the closely allied *Maoridaphne,* which has the sinus restricted to a faint excavation at the top of the axials. Occasionally typical *Daphnella* has obscure pillar plications, and they are present also in *Rugobela. Puha* differs from *Maoridaphne* in having a concave shoulder with the axials

strongly developed only below it, in the presence of pillar plications, and in the obsolete sinus. The range of the genus is (Hutchinsonian) Lower Miocene to (Opoitian) Lower Pliocene.

Puha fulgida Marwick, 1931.

1931 *Puha fulgida* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 150, Pl. 16, f. 312.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. loc. 1366, Ihungia Series, Gisborne District (Hutchinsonian) Lower Miocene.

Puha hebes (Hutton, 1873).

1873 *Pleurotoma hebes* Hutton, Cat. Tert. Moll. p. 4, "Oamaru, Poverty Bay (L)."
1915 *Lapparia hebes* : Suter, N.Z. Geol. Surv. Pal. Bull. 5, Pl. 5, fig. 8 (only) = (Buchanan's pencil drawing of Holotype from Oamaru).
1926 *Lapparia hebes* : Marwick, Trans. N.Z. Inst. 56, p. 277.
1926 *Vexithara hebes* : Finlay, Trans. N.Z. Inst. 56, p. 255.
1931 *Puha hebes* : Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 149.

Locality: Oamaru (exact horizon unknown).

Puha sinusigera n. sp. Pl. 4, fig. 8.

Shell small, of similar proportions and style of sculpture to *fulgida.* Whorls 10, including a tall conical sinusigera protoconch of 6 whorls, elaborately diagonally cancellated and terminated by a distinct protractive varix, being the upper exposed portion of a characteristic sinusigera labial claw. Spire about one and a third times height of aperture. Whorls sharply carinate, shouldered at upper two-thirds. Sculpture consisting of strong, close-spaced, sharp axials and moderately strong smooth spiral cords, which cross the axials and render the shoulder carina distinctly spinose. Three to four spirals on spire whorls, nine on body-whorl and base. Axials 17 per whorl. Pillar plications do not show, but these would be well within the aperture and apparent only if the outer lip was broken away. The new species differs from both *fulgida* and *hebes* in having more numerous axials and in the sutural fold not being tuberculate, but merely crossed by lamellar lines of growth. Also it is of much smaller size, but the unique type specimen may not be adult.

Height, 5.1 mm.; diameter, 2.4 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Pukeuri, near Oamaru (Awamoan) Middle Miocene.

Further new species of *Puha,* not good enough for description, are represented in the N.Z. Geological Survey collection from N.Z. G.S. locs. 1327, Wheao Series, Gisborne (Lower Miocene); 1340, Ngatapa S.D. (base of Mapiri Series); 1518, Opoiti (N.E.) S.D. ("Mapiri" = Taranakian) Upper Miocene; and 1554, Taramarama (S.W.) S.D., Wairoa (Opoitian) Lower Pliocene.

Genus **Cryptodaphne** n. gen.

Type: *C. pseudodrillia* n. sp. (Hutchinsonian) Lower Miocene.

At a glance the genotype could easily be mistaken for a *Cryptomella,* which belongs to the *Drillia* series. This superficial resemblance is merely the result of the strongly keeled whorls, for the shell has a perfect Daphnellid polygyrate reticulated protoconch of five whorls and an unmistakable Daphnellid sinus. From *Daphnella* it is separated by its angulate fusiform build, small aperture, contracted neck to a narrow, moderately long anterior canal and distinctive sculpture with spirals predominant.

Cryptodaphne pseudodrillia n. sp. Pl. 4, fig. 3.

Shell small, narrowly biconic; spire one and a third times height of aperture plus canal. Whorls 9, including a tall, narrow, polygyrate protoconch of 5 whorls, tip smooth, remaining nuclear whorls with distinct Daphnellid reticulation and terminating in a characteristic "Sinusigera" projection. Post-nuclear whorls with a prominently projecting rounded keel at the lower fourth of the whorl height, giving a pagoda-like aspect to the spire. Two much narrower spiral cords occupy the narrow space between the peripheral cord and the lower suture, and on the body-whorl and base there are eight rather distant, primary, smooth spiral cords, with 1-2 fine interstitial threads, and a further nine linear-spaced rounded cords on the neck and fasciole. Six fine spiral threads of uneven development occupy the extremely wide and steeply descending sinus area. The whole surface of the adult shell is crossed by close-spaced spiral threads producing reticulation. The sinus is of moderate depth, typically Daphnellid, descending almost vertically and then abruptly produced forwards. The aperture is small and narrowly-ovate, produced below into a rather long, somewhat constricted anterior canal, the end of which is damaged, but there is evidence of a slight notch and a weak fasciole.

Height, 6 mm.; diameter, 2.1 mm. (Holotype).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Localities: Pakaurangi Point Kaipara (type); Mahoenui beds, 1 mile W. of road tunnel N. entrance to Awakino Gorge (Hutchinsonian) Lower Miocene.

Genus **Eubela** Dall, 1889.

Type (o.d.): *Pleurotoma (Bela) limacina* Dall, Recent, West Atlantic.

Shell small, ovate. Protoconch Daphnellid. Body-whorl convex with a very short tapering neck and no fasciole. Shell smooth except for a subsutural row of strong beads. Dall (1889, p. 102) describes the sinus as shallow and the apex as a "Sinusigera." He also synonymises Watson's *Clathurella hormophora* Watson (1886 Chall. Zool. 15, pl. 21, f. 9) which shows the sinusigerid apex to have a well marked Daphnellid reticulation. Dall's species was from 805 fathoms, Gulf of Mexico, and Watson's from 450 fathoms off Sombrero Id., West Indies. They appear to represent distinct species. Several East and South African abyssal species were described by Thiele (1925, Deutsch. Tiefsee Expd., pp. 253-254)—His *Eubela* sp., *E. aequatorialis* and *E. distincta* are undoubted members, but his *E. plebeja* lacks the beaded suture and is therefore a doubtful inclusion.

In 1931 Dr. J. Marwick described an undoubted species in his *E. monile* from the Ihungia Series (Hutchinsonian) of Gisborne. This species has the characteristic beaded subsutural band, as well as a Daphnellid protoconch and sinus. It is an extraordinary instance of apparent discontinuous distribution, but doubtless other benthic species will become known. Experience with Turrids having the "Sinusigera" apex is that they are liable to turn up in areas remote from that of the type species, and that in general they are longer time ranging than the sedentary genera with the paucispiral apex.

Eubela monile Marwick, 1931.

1931 *Eubela monile* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 146, Pl. 16, f. 310.

Holotype in N.Z. Geological Survey Office, Wellington.
Locality: N.Z. G.S. locs. 1272 and 1292 (type) Ihungia Series, Gisborne (Hutchinsonian) Lower Miocene.

Eubela awakinoensis n. sp. Pl. 10, fig. 2.

This single fragmentary specimen is described, as its distinctive features will ensure its subsequent recognition. Spire whorls *Terebra*-like, flat and vertical in profile, except for a heavily ridged subsutural fold, which bears numerous small laterally compressed

but typical bead sculpture. The spire-whorls are smooth, but moderately strong spiral lirae cover the base and neck, and number approximately 16. The sinus and outer lip growth lines are particularly noticeable, the actual sinus being very broad and moderately deep, the lip then swinging forwards below in a big arc. The upper spire whorls and the neck are missing and the outer lip is damaged.

Height, 5.2 mm.; diameter, 2.1 mm. (actual, of incomplete specimen).

Holotype in Auckland Museum (Dr. H. J. Finlay collection).
Locality: Awakino Gorge, 1 mile west of road tunnel (Mahoenui Beds. Hutchinsonian) Lower Miocene.

Genus **Xanthodaphne** n. gen.

Type: *Pleurotoma (Thesbia) membranacea* Watson, Recent, abyssal, N.Z.

Under *Thesbia* (p. 131) I have shown that *Pleurotoma (Thesbia) membranacea* and *xanthias* Watson, two deep-water New Zealand species which have not been found since the original discovery by the "Challenger" Expedition, in 1100 fathoms off Cape Turnagain, have nothing in common with *Thesbia*. A new genus is here instituted for their reception, and the subfamily location, indicated clearly by the sutural sinus, is in the *Daphnellinae*.

The new genus seems allied to *Typhlosyrinx* Thiele, 1925, (type *vepallida* Martens) from deep-water off Aden, and less clearly to *Pontiothauma* Smith, 1894 (type *mirabile* Smith) from deep-water, Indian Ocean. *Xanthodaphne* differs from *Typhlosyrinx* in having a much larger, more inflated body-whorl, with a shorter spire, absence of axials, and a less attenuated protoconch, the last two whorls of which are sculptured with narrow raised lines, straight above, but curved forwards below. In both genera the sinus is deep, sutural, and then the thin outer lip sweeps forward in a wing-like curve, but in *Pontiothauma* the outer lip is very little produced, the spire is tall, the body-whorl truncated, and there is moderate axial as well as spiral sculpture.

Xanthodaphne membranacea (Watson, 1886).

1886 *Pleurotoma (Thesbia) membranacea* Watson "Challenger" Zool. 15, p. 333, Pl. 26, f. 9.
1913 *Daphnella (Thesbia) membranacea* Suter, Man. N.Z. Moll., p. 512.

Holotype in British Museum (Natural History).
Locality: 1100 fathoms off Cape Turnagain.

Xanthodaphne xanthias (Watson, 1886).

1886 *Pleurotoma (Thesbia) xanthias* Watson, "Challenger" Zool. 15, p. 334, Pl. 26, f. 10.
1913 *Daphnella (Thesbia) xanthias* Suter, Man. N.Z. Moll., p. 513.

Holotype in British Museum (Natural History).
Locality: 1100 fathoms off Cape Turnagain.

Family SPEIGHTIIDAE, nov.

Genus **Speightia** Finlay, 1926.

Type (o.d.): *Euthriofusus spinosus* Suter (Bortonian) Middle Eocene, N.Z.

The systematic position of the New Zealand Eocene *Speightia* is problematic, but undoubtedly the Peruvian (Negritos) Eocene *Andicula* is a near relative. I am indebted to Dr. J. Marwick for the loan of drawings of the holotype of *Surcula occidentalis* Woods, genotype of *Andicula* and also of *Surcula thomsoni* Woods, a second *Andicula* from the same formation. These bear a striking resemblance to *Speightia*, but lack one feature—the strong entering parietal spiral ridge so characteristic of the New Zealand shells.

Speightia has a Turrid feature in the sinus which is broadly and shallowly arcuate, with its apex just above the peripheral keel, but the ridged and suddenly bent pillar is foreign to the *Turridae,* being more suggestive of *Verconella (Buccinulidae)* and the *Fusinidae—Fasciolariidae.* However, the broad shoulder concavity in the latter is never quite so definitely a sinus as in *Speightia* and *Andicula.* Wrigley 1939 (p. 278) described the sinus of the Turrid genus *Surculites* as slightly concave, but increasing in exact proportion to the development of the carina; but in *Speightia* there is an opposite tendency, the peripheral spines rendering the sinus curves shallower at the apex of a spine than in the interspaces. Thus the sinus curves present a regular alternation.

Acting upon a suggestion by Dr. Marwick, I now consider *Speightia* and *Andicula* as representatives of an ancient stock, and as a preliminary to a better appreciation of their problematic relationship the Family *Speightiidae* is instituted, it being surmised that the *Turridae* and the *Speightiidae* arose divergently from a common hypothetical ancestor that may have been Fusoid.

A third member of the group is suggested by Dr. Marwick in *Surcula ingens* Mayer Eymar from the Eocene of Egypt. The family seems not to have survived the Eocene. *Speightia* is represented by a single New Zealand species so far restricted to the (Bortonian) Middle Eocene of New Zealand.

Speightia spinosa (Suter, 1917).

1917 *Euthriofusus spinosus* Suter, N.Z. Geol. Surv. Pal. Bull. 5, p. 24, Pl. 4, figs. 1, 2.
1926 *Speightia spinosa* Finlay, Trans. N.Z. Inst. 56, p. 252.

Holotype in N.Z. Geological Survey Office, Wellington.
Localities: N.Z. G.S. loc. 480, "Island Sandstone," Waihao River (type); Waihao Downs; Hampden and Black Point, Borton's (Bortonian) Middle Eocene.

Family THATCHERIIDAE, nov.

Genus Waitara Marwick, 1931.

Type (o.d.): *Turricula waitaraensis* Marwick (Urenuian) Upper Miocene, N.Z.

It is possible that *Waitara* may yet prove to be identical with *Thatcheria* Angas, 1877, type, *T. mirabilis* Angas, Recent, Japan, and *Cochlioconus* Yokoyama, 1928, type, *C. gradatus* Yokoyama, Pliocene, Japan. In any case all three are closely allied and represent a discordant Turrid-like group that cannot be satisfactorily placed in any of the nine subfamilies adopted in this bulletin.

Thatcheria has a large thin shell, very sharply keeled and with a very deep sutural sinus. *Cochlioconus* is almost certainly a synonym, although its author made no reference to *Thatcheria,* but compared his genus with the Cones. Anyone acquainted with *Thatcheria* would scarcely have overlooked the need for some comparison. The sinus in *Cochlioconus* is described as "Sutural notch deep, finger-like."

The protoconch is known only in the case of *Waitara,* and the sinus of that genus, although very similar to that of *Thatcheria,* does differ at its point of origin, in being narrowly concave before swinging forward, whereas the sinus in *Thatcheria* swings forward immediately. Until more evidence is available it is better to retain *Waitara* for New Zealand usage, particularly as comparative studies of the protoconchs still need to be made.

The subfamily location of these genera is problematic, for by the sutural sinus and absence of operculum *(Thatcheria)* they could be Daphnellid, yet the large, strongly keeled, thin shell suggests the *Cochlespirinae.* Objections to the former location are the lack of a typical Daphnellid apex (although this is not an essential) and the actual form of the sinus, which is deep Conid-like. With regard to the latter suggested location,

the absence of an operculum, again the sinus, and the full aperture, not narrowly tapered to a longish anterior canal, are discordant features. The pagodiform spire is, of course, quite foreign to the *Conidae.*

In order not to prejudice the status of the other Turrid subfamilies by forcing in such an aberrant group, it seems advisable to consider *Thatcheria* and its allies as representative of a new family, closely akin or parallel to the *Turridae,* for it seems to have arisen from the *Conidae,* but probably much later and independent of the early Conid-like Turrid divergent stock as represented by the *Conorbiinae.* The range of *Waitara* is (Wheao Series) Lower Miocene to (Opoitian) Lower Pliocene.

Key to Species of Waitara.

Aperture about equal to height of spire.
- Spiral sculpture very weak.
  - Shoulder concave .... **generosa* Marwick

Aperture about 1½ times height of spire.
- Spiral sculpture of weak narrow lirations.
  - Shoulder slightly convex .... **waitaraensis* (Marwick)
- Spiral sculpture distinct, moderately broad, flat cords.
  - Shoulder flat .... **pagodula* n. sp.

Aperture twice height of spire.
- Spiral sculpture dense, crisp, moderately strong.
  - Shoulder flat .... **liratula* n. sp.

Waitara generosa Marwick, 1931.

1931 *Waitara generosa* Marwick, N.Z. Geol. Surv. Pal. Bull. 13, p. 149, Pl. 18, f. 339.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1327, Wheao Series?, Gisborne, Lower Miocene.

Waitara waitaraensis (Marwick, 1926).

1926 *Turricula waitaraensis* Marwick. Trans. N.Z. Inst. 56, p. 324, Pl. 74, f. 9.

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1148, Mangare Road, Upper Waitara Survey District, Taranaki (Urenuian) Upper Miocene.

Waitara pagodula n. sp. Pl. 14, f. 7.

Shell of moderate size, with pagodiform spire and spiral sculpture of weak but distinct, rather broad, low, flat cords. The spire, compared with that of the next species, *liratula,* is more broadly conical, the shoulder is similarly broad and flat, but more sloping, and below the keel the whorls are not so undercut. The surface is rather worn in the only available specimen, but there is evidence of about six flattened cords without interstitials from the keel to the lower suture on the spire, and two bordering threads on the outer edge of the sohulder. The sinus is exactly as in *liratula..*

Height, 32 mm.; diameter, 23 mm. (actual; Holotype minus lower part of body-whorl).

Holotype in N.Z. Geological Survey Office, Wellington.

Locality: N.Z. G.S. loc. 1975, sandstone, Moutara Point, between Whangara and Tolaga Bay, Block 16, Uawa S.D., Gisborne (Urenuian or Opoitian) Upper Miocene or Lower Pliocene.

A somewhat similar but narrower new species, not good enough for description, is represented by a single specimen from N.Z. G.S. loc. 862, Waimate River, about 20 chains below Thomas's Hut, Waimata S.D., Gisborne, Lower Pliocene.

Waitara liratula n. sp. Pl. 14, f. 8.

Shell large, with short pagodiform spire and dense crisp spiral sculpture. Whorls about 10, including dome-shaped protoconch of two whorls bearing weak protractively arcuate axial growth threads (Text fig. B3). Spire whorls with a prominent sharp peripheral angulation situated just above the middle; above it there is a broad, almost flat, shoulder, and below the whorls slope inwards. On the body-whorl the angulation is less acute, for the base is slightly swollen above. Body-whorl gradually tapered, long, twice height of spire; canal with a broad, oblique, unnotched termination. The pillar is smooth and vertical, but with a very slight twist. The spiral sculpture is dense, crisp and moderately strong, composed of flattened cords and finer intermediates, somewhat irregularly arranged; about 95 on the body-whorl. On the spire whorls there are about 14 cords below the shoulder, two of them on the peripheral keel. Above the keel 4-6 weak spiral threads occupy the lower third of the shoulder. The sinus is sutural, narrowly concave at first, and then swinging forward far past its point of origin.

Height, 79 mm.; diameter (estimated), 37 mm. (actual, 44 mm. Holotype, badly squeezed).

Holotype in N.Z. Geological Survey Office, Wellington

Localities: N.Z. G.S. loc. 1543, mudstone and argillaceous sandstone beds, Mangawhero Stream, Taramarama (S.W.) S.D., Wairoa; N.Z. G.S. loc. 1882, mudstone below limestone, S. end of Castle, Castlepoint (Opoitian) Lower Pliocene.

GENERA AND SPECIES OF DOUBTFUL TURRID AFFINITY.

Genus **Heteroterma** Gabb, 1869.

Type (monotypy): *H. trochoidea* Gabb. Paleocene, California.

The family position of *Heteroterma* is still in doubt. Cossmann (1901) synonymised it with *Tudicla,* but Stewart (1927, p. 423) and Finlay and Marwick (1937, p. 84) recognise it as distinct and refer it back to Gabb's original location in the *Turridae.* The genus has a broad, shallow posterior sinus, not definitely Turrid; in fact many members of the *Fasciolariidae, Buccinulidae* and *Neptuniidae* are similarly broadly and shallowly sinused.

The New Zealand (Wangaloan) *Heteroterma zelandica* (Marshall 1917) certainly recalls the *Tudiclidae* in general facies, but it lacks the characteristic obliquely transverse pillar plait. There is, however, a slight thickening and ridging of the inner columellar margin similar to that found in some of the *Fasciolariidae,* and for this reason as well as the absence of convincing Turrid features, I am inclined to accept Cossmann's placing of the genus in the *Tudiculinae,* which Finlay and Marwick l.c. raise to Family rank.

Heteroterma is typically from the Californian Paleocene, has a probable member in the Patagonian Cretaceous *"Cominella" praecursor* Wilckens, and is represented in the New Zealand Upper Cretaceous (Wangaloan) by the one species, *H. zelandica* Marshall.

Pleurotoma otagoensis Wilckens, 1922.

Pleurotoma otagoensis Wilckens, 1922, N.Z. Geol. Surv. Pal. Bull. 9, p. 35, from Loc. 320, Shag Point, Otago (Upper Senonian Cretaceous) is based upon a cluster of imperfectly preserved shells, partially embedded in a lump of hard matrix. Protoconchs are missing or eroded in all the specimens, but the sinus is clearly shown to be broad and shallowly arcuate, occupying the whole of a broad shoulder No complete anterior canal is shown, so it is impossible to say if it is notched, channelled or simple. The most characteristic feature is the swinging forward of the outer lip in a big sweep, suddenly becoming abruptly recurrent at a basal angulation. which is secondary to the stronger peripheral

keel. The axials are thin and very protractively oblique, but are rendered strongly tuberculate at the periphery, also labial growth lines are rather more prominent than is usual in the *Turridae*. Dr. Marwick informs me that *otagoensis* probably equals *Perissoptera novoseelandica* Wilckens, 1922, a species already referred to *Struthioptera* Finlay & Marwick, 1937, p. 62 *(Aporrhaidae)*.

GENERA REMOVED FROM THE TURRIDAE.

Genus **Uttleya** Marwick, 1934.

Type (o.d.): *U. arcana* Marwick, 1934 (Castlecliffian) Upper Pliocene, N.Z.

This genus was doubtfully assigned to the *Turridae*, with the remarks that "The gently sinused outer lip and small size suggest the *Turridae*, but a similar sinus is found in the *Cominellidae* (e.g., *Cominista glandiformis* Reeve) and in other Buccinoid families. The concave set of the columella and inner lip, however, is unlike that of most Turrids and recalls that of Thaids and some Trophons. There is also a general resemblance to some Pyrenids."

As one guess is as good as another at this stage of our knowledge of this imperfectly known genus, I am inclined to refer it to the *Muricidae*, especially on account of the concave columella; certainly it is not a Turrid.

Genus **Aoteatilia** Powell, 1939.

Type (o.d.): *Daphnella substriata* Suter. Recent, N.Z.

I proposed this (Rec. Auck. Inst. Mus. 2, p. 235) as a genus of the *Pyrenidae* for the reception of four New Zealand Recent species previously assigned to *Daphnella*. Certainly some Turrids so closely simulate Pyrenids that their family location on external characters is indecisive. My main reason in this instance for the transfer of Suter's *Daphnella substriata* and its allies to the *Pyrenidae* is the fact that *substriata* has a persistent pink protoconch similar to that of *Zemitrella sulcata* and, further, *sulcata*, although undoubtedly Pyrenid has a shallow, broad shoulder sinus identical with that of *Aoteatilia*. It may be noted also that *Mangilia cophinodes* Suter, 1908, from reference to the type, proves to belong to the Pyrenid genus *Macrozafra*. It also has a pink protoconch.

PHYLOGENY OF THE TOXOGLOSSA.

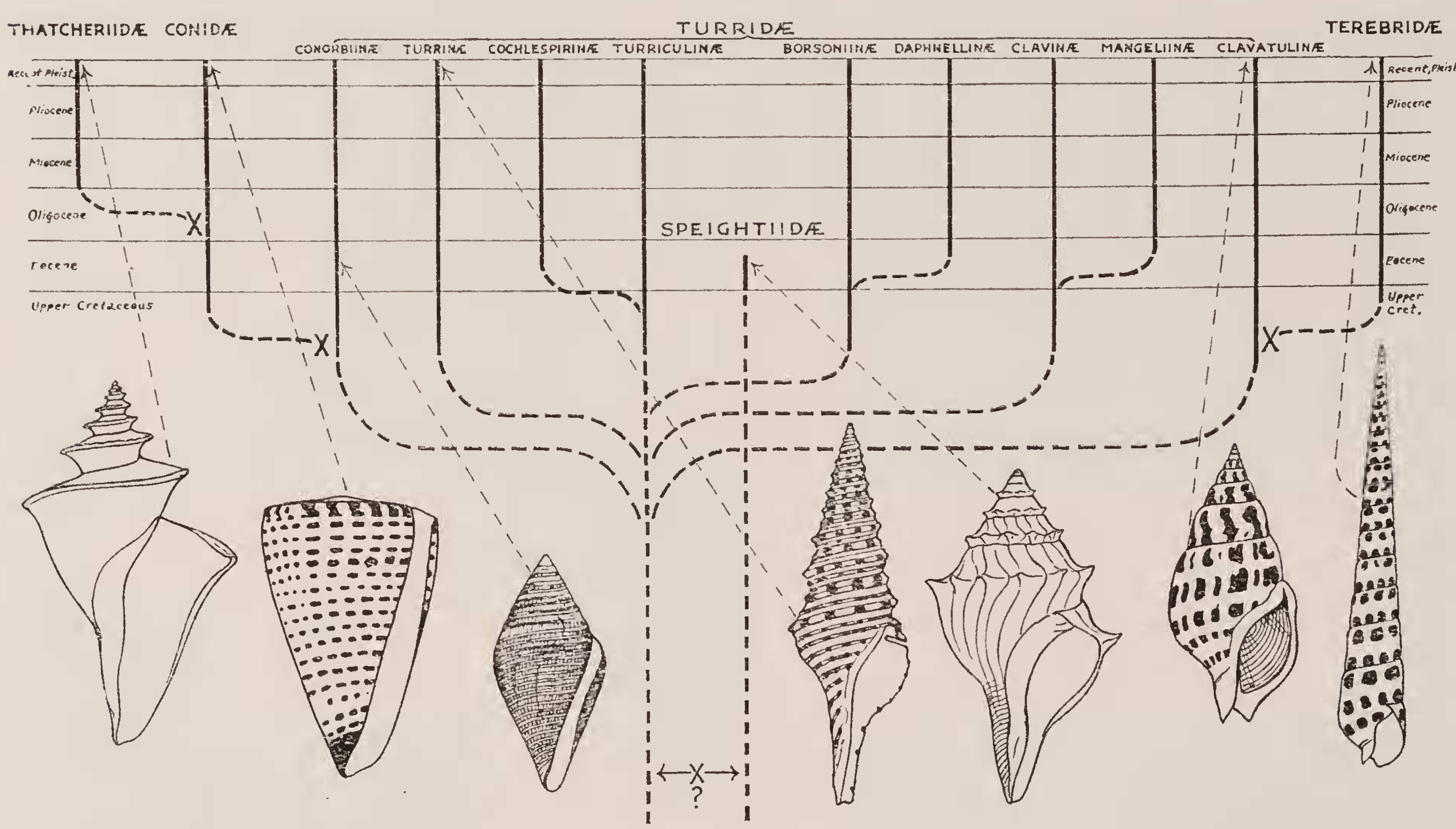
It has been already noted (p. 5) that the earliest known Turrids are at least Cretaceous and that as the family had even then achieved a complex divergence we must assume a much earlier inception for the family. Gregorio (1930, p. 18) proposed *Turriculina* for an alleged Turrid from the Lias of Sicily. If correctly assigned, this interesting record demands an early origin for the family. The families *Conidae* and *Terebridae*, two other members of the Toxoglossa, are respectively more compact assemblages than the Turrids, and so it is not difficult to imagine these as offshoots from the ancestral Turrid line, particularly as both are poorly represented in the Upper Cretaceous and do not seem to occur earlier than that. Also there is marked uniformity in the dentition, all having the true toxoglossid radula. The *Turridae* alone exhibit diversity in the radula, covering what is considered to be prototypic, in which the presence of laterals and a central tooth as well as marginals harks back to the *Rachiglossa* and *Taenioglossa*.

Two new toxoglossid families are proposed in this paper—the *Thatcheriidae* and the *Speightiidae*. The former in having marked Conid affinity in respect to its sinus is indi-

cated as a late Tertiary offshoot from the *Conidae,* while the *Speightiidae* covers an early wide-spread group that did not survive the Eocene. The *Speightiidae* is considered to be a near ally of the *Turridae,* both probably having diverged from a prototype that may have been Fusoid.

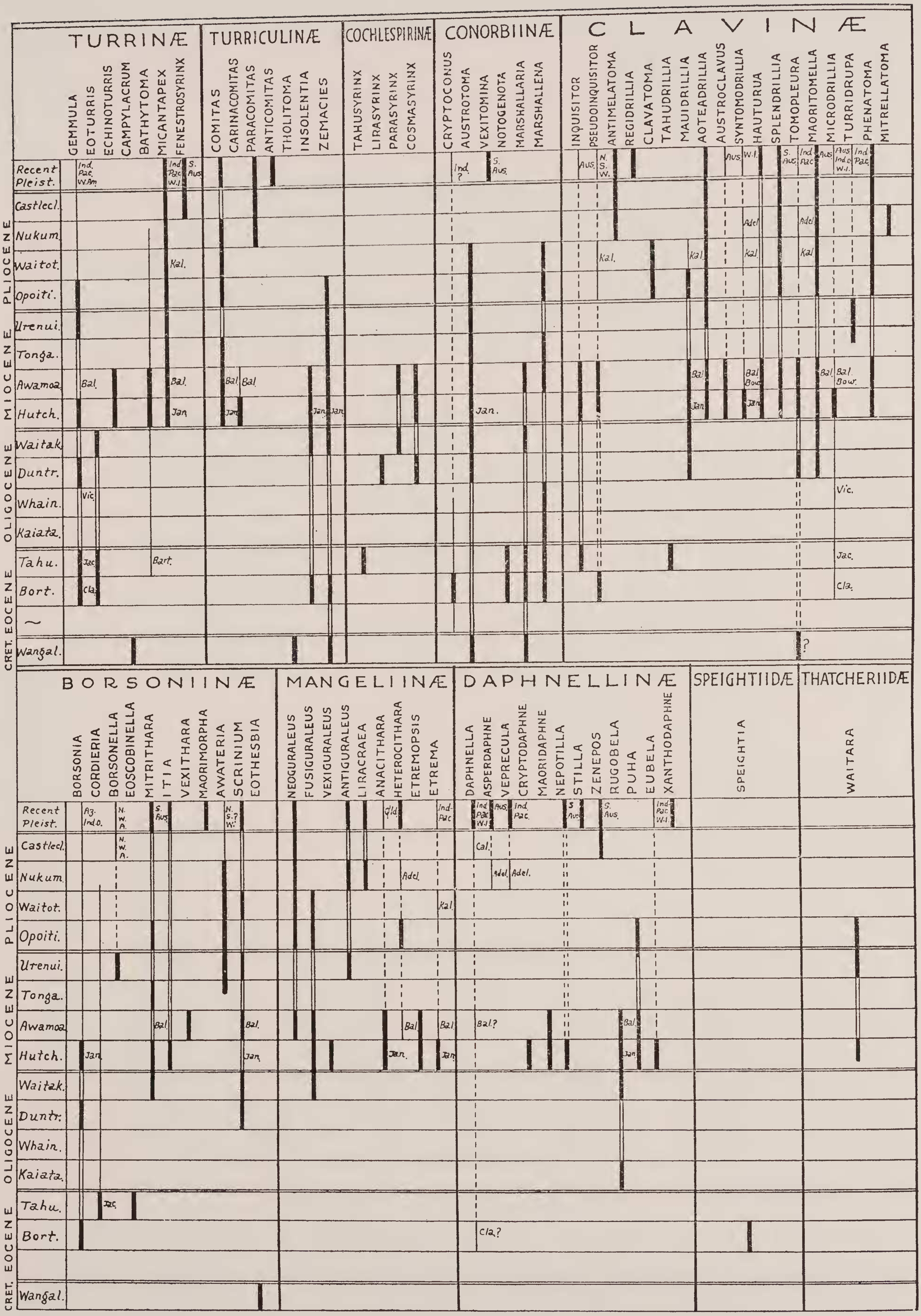
In deriving the *Conidae* from the *Turridae* per ancestral *Conorbiinae,* I am taking into account Cossmann's (1896) summary of von Koenen's argument that as all of the two shell layers and part of the third in the interior parts of the upper whorls of *Conorbis dormitor* are resorbed as in *Conus,* then that genus is essentially of the *Conidae.* Rather, I would consider *Conorbis* by its Turrid sinus and protractively arcuate outer lip to be a true Turrid, and possibly the only member of this subfamily of the Turrids to possess the resorbsion habit. Certainly, *Conorbis* possessed this faculty to a small degree when compared with the ability of almost complete destruction of the interior whorls as exhibited by many true Cones, and for this reason, and the nature of the sinus, I see in a *Conorbis*-like ancestor a Turrid which was the radicle of the true Conid stock. The earliest known *Conorbis* seems to be *C. mcnairyensis* Wade, 1917, from the Ripley formation, Upper Cretaceous, Tennessee. The fact remains, however, that whether *Conorbis* be considered of the *Conidae* or of the *Turridae,* it at least affords the link between these two families. Similarly there can be little doubt that the *Terebridae* had its origin from Turrid stock in some ancestor of the subfamily *Clavatulinae.*

The most successful early Turrid subfamily groups were the *Conorbiinae, Turriculinae, Turrinae* and *Clavatulinae.* To-day the *Clavinae, Mangeliinae* and *Daphnellinae* are the most successful. It would seem that the modern vigorous development of the families *Conidae* and *Terebridae* can be readily understood if we accept their comparatively late (Upper Cretaceous) generation from the *Conorbiinae* and *Clavatulinae* respectively.



PHYLOGENY OF THE TOXOGLOSSA.

Continuous heavy vertical lines represent known distribution; interrupted heavy lines, hypothetical derivations; and an X the suggested approximate point of divergence of a family. The figures (from left) are: *Thatcheria mirabilis* Angas (Gt.), *Conus literatus* Linn (Gt.), *Conorbis dormitor* (Sowerby) (Gt.), *Turris babylonius* (Gmel.) (Gt.), *Speightia spinosa* (Suter) (Gt.), *Pusionella nifat* (Brug.). (A Turrid closely resembling a Terebrid) and *Terebra subulata* (Linn.) (Gt.). **Note:** Gt. = Genotype. All except *Pusionella* are type genera for either a family or a Turrid subfamily of the *Toxoglossa.*



Text fig. G. Stratigraphical Table of New Zealand Turridae. (Description on next page.)

Text fig. G. **STRATIGRAPHICAL TABLE OF N.Z. TURRIDAE.**

The New Zealand distribution is shown by heavy lines—connecting parallel lines indicate probable continuity. Thin lines show foreign ranges—connecting dotted lines similarly represent unsubstantiated but probable continuity.

Foreign occurrences are noted by abbreviations; these stage names are placed approximate to the N.Z. local stage names, as given in the marginal vertical sequence. **Key to abbreviations:—Recent:** Aus. = Australia (widely distributed), Az. = Azores, Ind. = India, Ind. O. = Indian Ocean, Ind. Pac. = Indo-Pacific, N.S.W. = New South Wales, N.W.A. = North West America, Q'ld. = Queensland, S. Aus. = South Australia, W.I. = West Indies. **Pliocene:** Adel. = Adelaidean, S. Australia; Cal. = Caloosahatchee, Florida; Kal. = Kalimnan, Victoria. **Miocene:** Bal. = Balcombian, Victoria; Bow. = Bowden, Jamaica; Jan. = Janjukian, Victoria. **Oligocene:** Vic. = Vicksburgian, Southern United States. **Eocene:** Bar. = Bartonian, England; Cla. = Claibornian; and Jac. = Jacksonian. Southern United States. The numerous European stage names are not indicated, but their ranges are plotted. Details of occurrences are available in Cossmann's Ess. Pal. Comp. 2.

STRATIGRAPHICAL RESULTS.

In spite of the present large total of 389 species of New Zealand Turrids and the fact that most of them are fossils, only 79 being of Recent occurrence, it is certain that a considerable percentage of fossil species will eventually be added to the present census.

The most productive stages have been the Awamoan, Hutchinsonian and Tahuian of the middle and lower Tertiary, while the four Pliocene divisions can be considered tolerably well known.

In the accompanying stratigraphical table most of the lineages are shown to commence abruptly at the Hutchinsonian, while others represented in the (Bortonian and Tahuian) Eocene are missing from the Oligocene stages, but reappear in the basal (Hutchinsonian) Miocene. The Upper Oligocene in New Zealand is represented by a few good fossiliferous localities—Otiake, Wharekuri and Chatton—but the complete absence of macro-fossils from the Middle and Lower Oligocene presents a blind spot in the sequence. Local dredging results have shown that Turrid species exhibit a narrow range of preference in respect to the nature and texture of the substratum. Thus apparent anomalies in distribution shown by discontinuity in the table can be accounted for in some instances by the absence of the requisite substratum in respect to the known fossiliferous localities. Another blank is occasioned by the absence of a fossiliferous Lower Eocene link between the (Bortonian) Middle Eocene and the (Wangaloan) Upper Cretaceous.

The graphic presentation of the stratigraphical table makes detailed notes superfluous, the ranges of genera for the individual stages being apparent at a glance. New Zealand lineages are shown by heavy lines, connected by parallel lines where gaps occasioned by apparently incomplete records occur. Extensions by means of thin lines and fine dots indicate foreign ranges of these genera. Localities and stages, approximately equivalent to the New Zealand stratigraphical scheme, are indicated by symbols which are explained in a footnote to the diagram.

A notable feature emphasized by this diagram, but only in respect to New Zealand, is the late development of the *Mangeliinae* and *Daphnellinae,* which are here unrepresented earlier than the Oligocene and are not well developed until the Miocene.* Conversely the *Conorbiinae* is strongly represented from the Cretaceous to the Miocene, after which only one local genus succeeds to Recent times. Five of the eight subfamilies are represented

*In the S.E. United States of America both subfamilies are represented in the (Claibornian) Middle Eocene.

in the New Zealand Upper Cretaceous, so, as already noted, a long previous development for the family is indicated. One subfamily, the *Clavatulinae,* is unrepresented, its distribution being mainly Recent African, with some Southern European and Asiatic Tertiary members, as well as a Central American Tertiary to Recent genus. Some extraordinary inclusions in the fauna such as *Microdrillia* and *Eubela* illustrate how incomplete is our knowledge of the geographic range of certain Turrid genera of wide or apparently "discontinuous" distribution.

The system of New Zealand geological stage names used herein is that of Finlay and Marwick (1940, pp. 77-135). Their synoptic table is reproduced below.

TABLE OF NEW ZEALAND STAGE NAMES.

Pliocene	Upper	Castlecliffian (Thomson)	
	Middle	Nukumaruan (Morgan)	
	Lower	Waitotaran (Thomson) Opoitian (Finlay)	
Miocene	Upper	Urenuian (Henderson) Tongaporutuan (Marwick)	(Taranakian)
	Middle	Awamoan (Thomson)	
	Lower	Hutchinsonian (Thomson)	
Oligocene	Upper	Waitakian (Park) [Includes Duntroonian (Allan)]	
	Middle	Whaingaroan (Finlay)	(Ototaran)
	Lower	Kaiatan (Morgan) [Includes Waiarekan (Thomson)]	(Ototaran)
Eocene	Upper	Tahuian (Allan)	(Waimatean)
	Middle	Bortonian (Park)	(Waimatean)
	Lower	[Present but not named]	
Cretaceous	Danian	Wangaloan (Morgan)	

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DESCRIPTION OF PLATES

Plate 1.

Fig. 1. **Austroclavus clifdenensis** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 8.4 x 3 mm.
Fig. 2. **Austroclavus marshalli** n.sp. (Holotype) Pukeuri (Awamoan). 9 x 3.1 mm.
Fig. 3. **Austroclavus finlayi** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 8.1 x 3 mm.
Fig. 4. **Austroclavus awakinoensis** n.sp. (Holotype) Awakino Gorge (Awamoan). 6.5 x 2.4 mm.
Fig. 5. **Aoteadrillia finlayi** n.sp. (Holotype) Petane (Nukumaruan). 12.1 x 4.6 mm.
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Fig. 7. **Mauidrillia supralaevis** n.sp. (Holotype) Target Gully (Awamoan). 10 x 4.1 mm.
Fig. 8. **Mauidrillia imparilirata** n.sp. (Holotype) Pakaurangi Point (Hutchinsonian) 6.8 x 3 mm.
Fig. 9. **Mauidrillia angustata** n.sp. (Holotype) Pukeuri (Awamoan). 9.5 x 3.4 mm.
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Fig. 11. **Mauidrillia inaequalis** n.sp. (Holotype) Otiake (Waitakian). 16 x 4 mm.
Fig. 12. **Mauidrillia clavicula** n.sp. (Holotype) Target Gully (Awamoan). 8.25 x 3.1 mm.

Plate 2.

Fig. 1. **Splendrillia debilis** Finlay, 1927 (Holotype = **parva** Suter, 1908) Recent, Cuvier Id. 37 fath. 8 x 3.5 mm.
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Fig. 4. **Splendrillia otagoensis** n.sp. (Holotype) Recent, Oamaru, 50 fath. 7.6 x 3 mm.
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Fig. 7. **Aoteadrillia thomsoni** n.sp. (Holotype) Marlborough (Waitotaran) 7.6. (canal missing) x 5 mm.
Fig. 8. **Aoteadrillia otagoensis** n.sp. (Holotype) Recent, Otago Heads, 50 fath. 8.2 x 3 mm.
Fig. 9. **Microdrillia pakaurangia** n.sp. (Holotype) Pakaurangi Point (Hutchinsonian). 8.75 x 3.5 mm.
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Plate 5.

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Fig. 2. **Vexiguraleus clifdenensis** n.sp. (Holotype) Clifden 6b. (Hutchinsonian). 5.2 x 2.3 mm.
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Fig. 7. **Anacithara finlayi** n.sp. (Holotype) Clifden 7c. (Awamoan). 4.35 x 2.3 mm.
Fig. 8. **Anacithara clifdenica** n.sp. (Holotype) Clifden 4b. (Hutchinsonian). 4.9 x 2.3 mm.
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Fig. 3. **Neoguraleus benthicola** n.sp. (Holotype) Recent, Oamaru, 50 fath. 8.1 x 3 mm.
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Fig. 5. **Neoguraleus sandersonae** n.sp. (Holotype) Recent, Whangaroa. 9.4 x 4 mm.
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Fig. 6. **Neoguraleus (Fusiguraleus) rigidus** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 4.7 x 2 mm.
Fig. 7. **Neoguraleus (Fusiguraleus) marwicki** n.sp. (Holotype) Clifden 7a. (Awamoan). 5.8 x 2.4 mm.
Fig. 8. **Neoguraleus (Fusiguraleus) lawsi** n.sp. (Holotype) Ardgowan (Awamoan). 9 x 3 mm.
Fig. 9. **Neoguraleus (Fusiguraleus) mancus** n.sp. (Holotype) Target Gully (Awamoan). 6.2 x 2.7 mm.
Fig. 10. **Neoguraleus (Fusiguraleus) nutans** n.sp. (Holotype) Otiake (Waitakian). 6.5 x 2.7 mm.
Fig. 11. **Neoguraleus (Fusiguraleus) porrectus** n.sp. (Holotype) Pukeuri (Awamoan). 7.8 x 2.8 mm.

Plate 8.

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Fig. 2. **Antiguraleus abnormis** (Hutton) (Topotype) Petane (Nukumaruan). 5.4 x 2.8 mm.
Fig. 3. **Antiguraleus rossianus** n.sp. (Holotype) Recent, Auckland Is. 95 fath. 4.3 x 1.8 mm.
Fig. 4. **Antiguraleus otagoensis** n.sp. (Holotype) Recent, Oamaru, 50 fath. 6 x 3 mm.
Fig. 5. **Antiguraleus pedicus** n.sp. (Holotype) Recent, Snares Is., 50 fath. 5.7 x 2.3 mm.
Fig. 6. **Antiguraleus fenestratus** n.sp. (Holotype) Recent, Poor Knights Is., 60 fath. 5.4 x 2.3 mm.
Fig. 7. **Antiguraleus deceptus** n.sp. (Holotype) Petane (Nukumaruan). 6.1 x 3 mm.
Fig. 8. **Neoguraleus (Fusiguraleus) raricostatus** n.sp. (Holotype) Ardgowan (Awamoan). 8 x 2.7 mm.

Fig. 9. **Neoguraleus (Fusiguraleus) platycostatus** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 5.9 x 2.2 mm.
Fig. 10. **Neoguraleus (Fusiguraleus) exsculptus** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 4.5 x 2 mm.
Fig. 11. **Neoguraleus (Fusiguraleus) angustatus** n.sp. (Holotype) Clifden 8a. (Awamoan). 4.7 x 1.8 mm.

Plate 9.

Fig. 1. **Etremopsis quadrispiralis** n.sp. (Holotype) Dyer's Run (Awamoan). 8 x 3.4 mm.
Fig. 2. **Etremopsis oamarutica** n.sp. (Holotype) Ardgowan (Awamoan). 5.9 x 2.5 mm.
Fig. 3. **Etremopsis aequisculpta** n.sp. (Holotype) Target Gully (Awamoan). 7 x 3.1 mm.
Fig. 4. **Etremopsis haroldi** n.sp. (Holotype) Ardgowan (Awamoan). 6 x 2.2 mm.
Fig. 5. **Etremopsis latiapex** n.sp. (Holotype) Pukeuri (Awamoan). 6 x 2.8 mm.
Fig. 6. **Etremopsis carinapex** n.sp. (Holotype) Pukeuri (Awamoan). 4 x 1.65 mm.
Fig. 7. **Etremopsis erecta** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 6.4 x 2.7 mm.
Fig. 8. **Etremopsis elata** n.sp. (Holotype) Pukeuri (Awamoan). 5.1 x 2.15 mm.
Fig. 9. **Etremopsis clifdenica** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 4.4 x 2.2 mm.
Fig. 10. **Etremopsis compta** n.sp. (Holotype) Clifden (E. side B.) (Hutchinsonian). 5.5 x 2.4 mm.
Fig. 11. **Neoguraleus (Fusiguraleus) sutherlandicus** n.sp. Sutherland's (Awamoan). 8 x 2.7 mm.
Fig. 12. **Neoguraleus deceptus** n.sp. (Holotype) Target Gully (Awamoan). 6 x 2.3 mm.

Plate 10.

Fig. 1. **Paracomitas castlecliffensis** (Marshall & Murdoch, 1919) (Topotype) Castlecliff (Castlecliffian). 15 x 5.75 mm.
Fig. 2. **Eubela awakinoensis** n.sp. (Holotype) Awakino Gorge (Awamoan). 5.2 x 2.1 mm.
Fig. 3. **Etrema kaipara** n.sp. (Holotype) Pakaurangi Point (Hutchinsonian). 6.7 x 3 mm.
Fig. 4. **Austrodrillia (Regidrillia) sola** n.sp. (Holotype) 100 fath. Three Kings Is. 10.3 x 4.7 mm.
Fig. 5. **Comitas (Carinacomitas) subcarinapex** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 10.5 x 4 mm.
Fig. 6. **Comitas allani** n.sp. (Holotype) Devil's Elbow, Hawke's Bay (Nukumaruan) 26.75 x 10 mm.
Fig. 7. **Insolentia elegantula** n.sp. (Holotype) Dyer's Run (Awamoan). 14.15 x 4.7 mm.
Fig. 8. **Phenatoma precursor** n.sp. (Holotype) Napier (Nukumaruan). 21.3 x 8.3 mm.
Fig. 9. **Phenatoma lawsi** n.sp. (Holotype) Pakaurangi Point (Hutchinsonian). 9 x 4.8 mm.
Fig. 10. **Cryptoconus** n.sp. " Island sandstone " Waihao River (Bortonian). 25.4 x 11.7 mm.
Fig. 11. **Anticomitas vivens** n.sp. (Holotype) 140 fath. Three Kings Is. 9.5 x 4.1 mm.

Plate 11.

Fig. 1. **Awateria thomsoni** n.sp. (Holotype) Starborough Creek (Waitotaran). 7.5 x 3.6 mm.
Fig. 2. **Awateria echinata** n.sp. (Holotype) Mahia (N.W.) S.D., Wairoa (top of Opoitian ?). 4 x 2 mm.
Fig. 3. **Awateria personata** n.sp. (Holotype) Taramarama (S.W.) S.D., Wairoa (Opoitian). 7 x 4.1 mm.
Fig. 4. **Awateria mollyae** King, 1933 (Holotype) E. of Lake Ferry Palliser Bay (Nukumaruan). 11 x 5 mm. (Apex missing).
Fig. 5. **Awateria marwicki** n.sp. (Holotype) Poiti (N.E.) S.D., Wairoa (" Mapiri "= Taranakian). 5.2 x 3 mm.
Fig. 6. **Awateria wairoaensis** n.sp. (Holotype) W. of mouth of Wairoa River (Waitotaran). 10 x 4.5 mm.
Fig. 7. **Awateria defossa** n.sp. (Holotype) Poiti (N.E.) S.D., Wairoa ("Mapiri = Taranakian). 6.25 x 3.8 mm.
Fig. 8. **Scrinium thomsoni** n.sp. (Holotype) Starborough Creek (Waitotaran). 15 x 7.5 mm.
Fig. 9. **Scrinium finlayi** n.sp. (Holotype) Target Gully (Awamoan). 7 x 2.75 mm.
Fig. 10. **Turridrupa maoria** n.sp. (Holotype) Ngatapa S.D. (Mapiri = Taranakian). 5.3 x 2.25 mm.
Fig. 11. **Rugobela nodulosa** n.sp. (Holotype) All Day Bay Otepopo S.D. (Awamoan). 12 x 5.1 mm.
Fig. 12. **Mitrithara barrierensis** n.sp. (Holotype) 20 fath. Little Barrier Id. 7 x 3 mm.
Fig. 13. **Mitrithara waitakiensis** n.sp. (Holotype) Otiake (Waitakian). 9 x 3.5 mm.

Plate 12.

Fig. 1. **Splendrillia lincta** n.sp. (Holotype) Waiau S.D. (Opoitian). 17.9 x 6.8 mm.
Fig. 2. **Splendrillia armata** n.sp. (Holotype) Amuri-Kaikoura (Nukumaruan). 14.75 x 6 mm. (imperfect).
Fig. 3. **Splendrillia anomala** n.sp. (Holotype) Castlecliff (Castlecliffian). 10.8 x 4.4 mm.
Fig. 4. **Splendrillia cristata** n.sp. (Holotype) Amuri-Kaikoura (Nukumaruan). 12 x 4.5 mm.
Fig. 5. **Splendrillia annectens** n.sp. (Holotype) Castlecliff (Castlecliffian). 14.4 x 5.6 mm.
Fig. 6. **Splendrillia clava** n.sp. (Holotype) Dannevirke S.D. (Waitotaran). 15.8 x 6.4 mm.
Fig. 7. **Mitrellatoma angustata** (Hutton, 1886) n. gen. (Topotype) Petane (Nukumaruan). 10.5 x 4 mm.
Fig. 8. **Clavatoma pulchra** n. gen. & sp. (Holotype) Waiau S.D. (Opoitian). 22.5 x 8 mm.
Fig. 9. **Tomopleura clifdenica** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 10.1 x 3.6 mm.
Fig. 10. **Tomopleura finlayi** n.sp. (Holotype) Ardgowan (Awamoan). 6.5 x 2.7 mm.
Fig. 11. **Tomopleura transenna** (Suter, 1917) Pukeuri (Awamoan). 10 x 3.5 mm.
Fig. 12. **Tomopleura waiauensis** n.sp. (Holotype) Clifden 8a. (Awamoan). 8.1 x 3.3 mm.
Fig. 13. **Aoteadrillia trifida** n.sp. (Holotype) Waipawa S.D. (Lr. Nukumaruan). 8 x 2.9 mm.
Fig. 14. **Aoteadrillia waihuaensis** n.sp. (Holotype) Wairoa S.D. (Waitotaran). 8.9 x 3.4 mm.

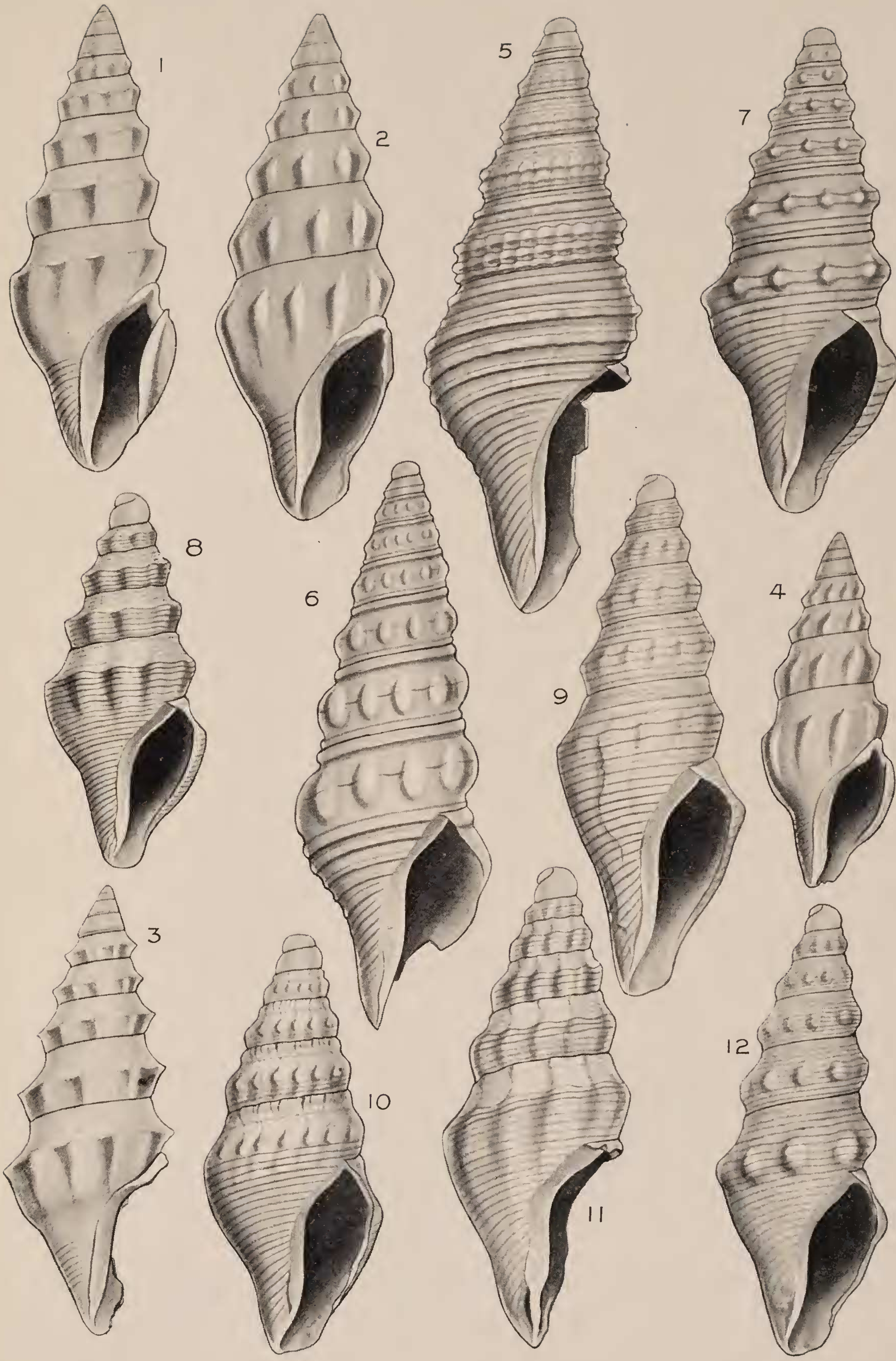
Plate 13.

Fig. 1. **Micantapex murdochi** (Finlay, 1930) (Topotype) Petane, Hawke's Bay (Nukumaruan). 28.5 x 12 mm.
Fig. 2. **Micantapex paucispiralis** n.sp. (Holotype) Makara Stream, Wairarapa (Lr. Nukumaruan). 20.4 x 8 mm.
Fig. 3. **Micantapex finlayi** Powell, 1940 (Holotype) 110 fath. Great Barrier Id. 14.35 x 7 mm.
Fig. 4. **Micantapex proavitus** n.sp. (Holotype) Motuotaraia (N.W.) S.D. (Waitotaran). 18.75 x 9 mm.
Fig. 5. **Micantapex discors** n.sp. (Holotype) Wairoa River (Waitotaran). 25.1 x 10.5 mm. (Estimated 11 mm.)
Fig. 6. **Lirasyrinx anomala** n. gen. & sp. (Holotype) Wharekuri (Duntroonian). 7.1 x 4.6 mm. (Canal missing).
Fig. 7. **Comitas latescens** (Hutton, 1873) (Holotype) Mt. Brown (Hutchinsonian). 20.4 x 10 mm. (Apex missing).
Fig. 8. **Maoritomella robusta** n.sp. (Holotype) Woodville (N.E.) S.D. (Nukumaruan 15.1 x 6 mm.
Fig. 9. **Maoritomella pagodula** n.sp. (Holotype) Tahoraite (S.W.) S.D. Dannevirke (Upper Waitotaran). 12 x 5.6 mm.
Fig. 10. **Aoteadrillia rawitensis** (Hedley, 1922) (Neotype) Aurere, Doubtless Bay. 11.4 x 5 mm.
Fig. 11. **Neoguraleus waihuaensis** n.sp. (Holotype) Wairoa S.D. (Waitotaran). 6.4 x 2.4 mm.
Fig. 12. **Gemmula lawsi** n.sp. (Holotype) Pakaurangi Point (Hutchinsonian). 24.6 x 8 mm.
Fig. 13. **Gemmula longwoodensis** n.sp. (Holotype) Longwood S.D. Orepuki (Duntroonian). 10.7 x 4 mm.
Fig. 14. **Gemmula clifdenensis** n.sp. (Holotype) Clifden 6c. (Hutchinsonian). 18 x 7 mm.

Plate 14.

Fig. 1. **Marshallena anomala** n.sp. (Holotype) Target Gully (Awamoan). 25.75 x 12.3 mm.
Fig. 2. **Marshallena impar** n.sp. (Holotype) Takapau (N.E.) S.D. (Up. Waitotaran). 23.75 x 10.5 mm.
Fig. 3. **Marshallaria senta** n.sp. (Holotype) Rifle Butts, Oamaru (Awamoan). 48.5 x 21 mm.
Fig. 4. **Zemacies awakinoensis** n.sp. (Holotype) Mokau River, Awakino North S.D. 37.6 x 14.7 mm.
Fig. 5. **Austrotoma ampla** n.sp. (Holotype) Awatere (Waitotaran). 68.5 x 30 mm.
Fig. 6. **Austrotoma nervosa** n.sp. (Holotype) Mt. Harris (Awamoan). 44 x 15 mm.
Fig. 7. **Waitara pagodula** n.sp. (Holotype) Uawa S.D. Gisborne (Urenuian or Opoitian) 32 x 23 mm.
Fig. 8. **Waitara liratula** n.sp (Paratype) Taramarama (S.W.) S.D. Wairoa (Opoitian) 17.5 x 16 mm (spire only).
Fig. 9. **Cosmasyrinx semilirata** n.sp. (Holotype) Longwood S.D. Orepuki (Duntroonian) 13 x 5.8 mm.
Fig. 10. **Scrinium sandersonae** Bucknill, 1927 (Holotype) Matauri Bay, Whangaroa. 12.5 x 6.5 mm.
Fig. 11. **Nepotilla finlayi** Powell 1937 (Holotype) off Three Kings Is. 260 metres. 2.2 x 1.4 mm.
Fig. 12. **Stilla paucicostata** Powell, 1937 (Holotype) off Three Kings Is. 260 metres. 1.7 x 0.95 mm.

PLATE 1.



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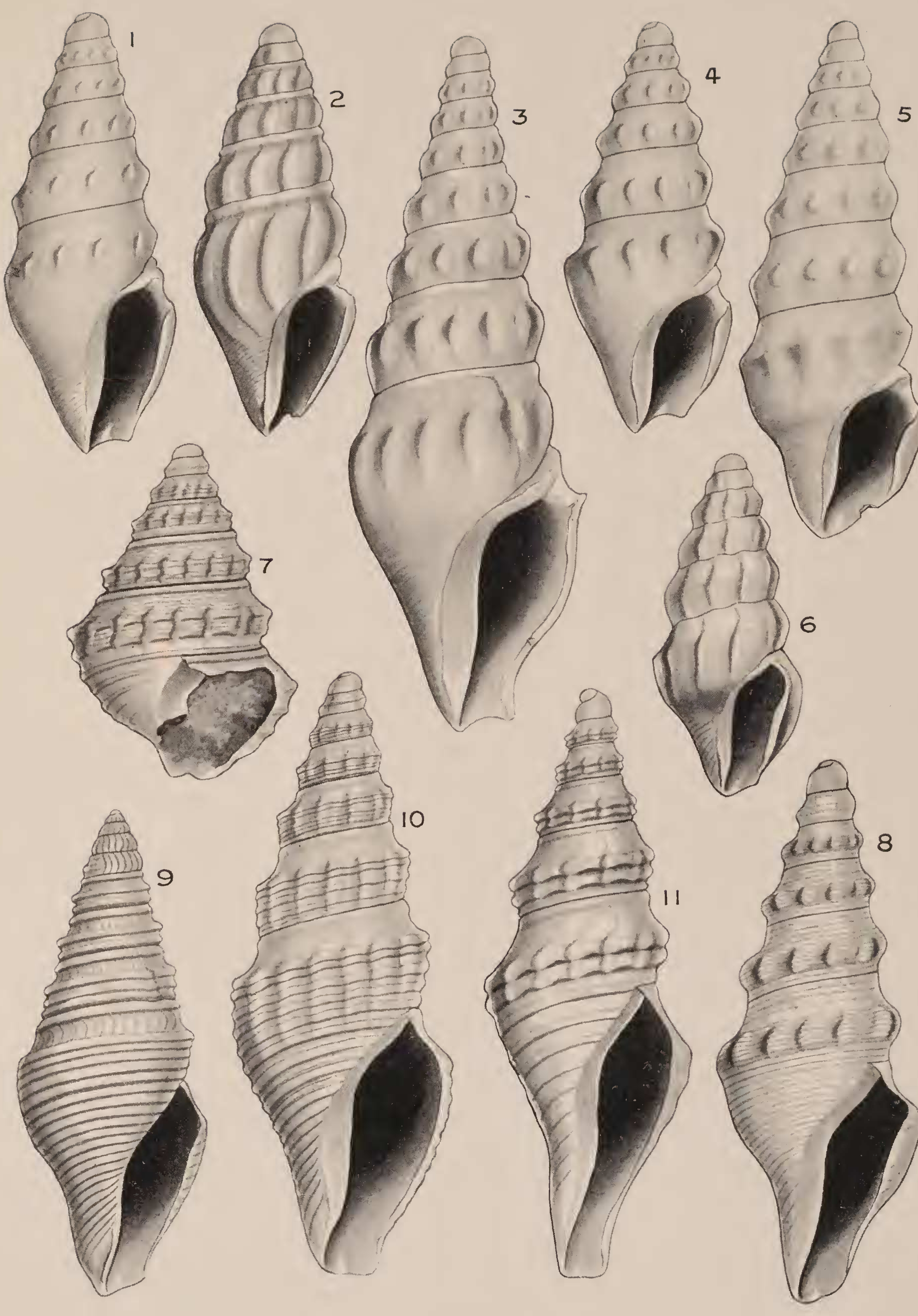

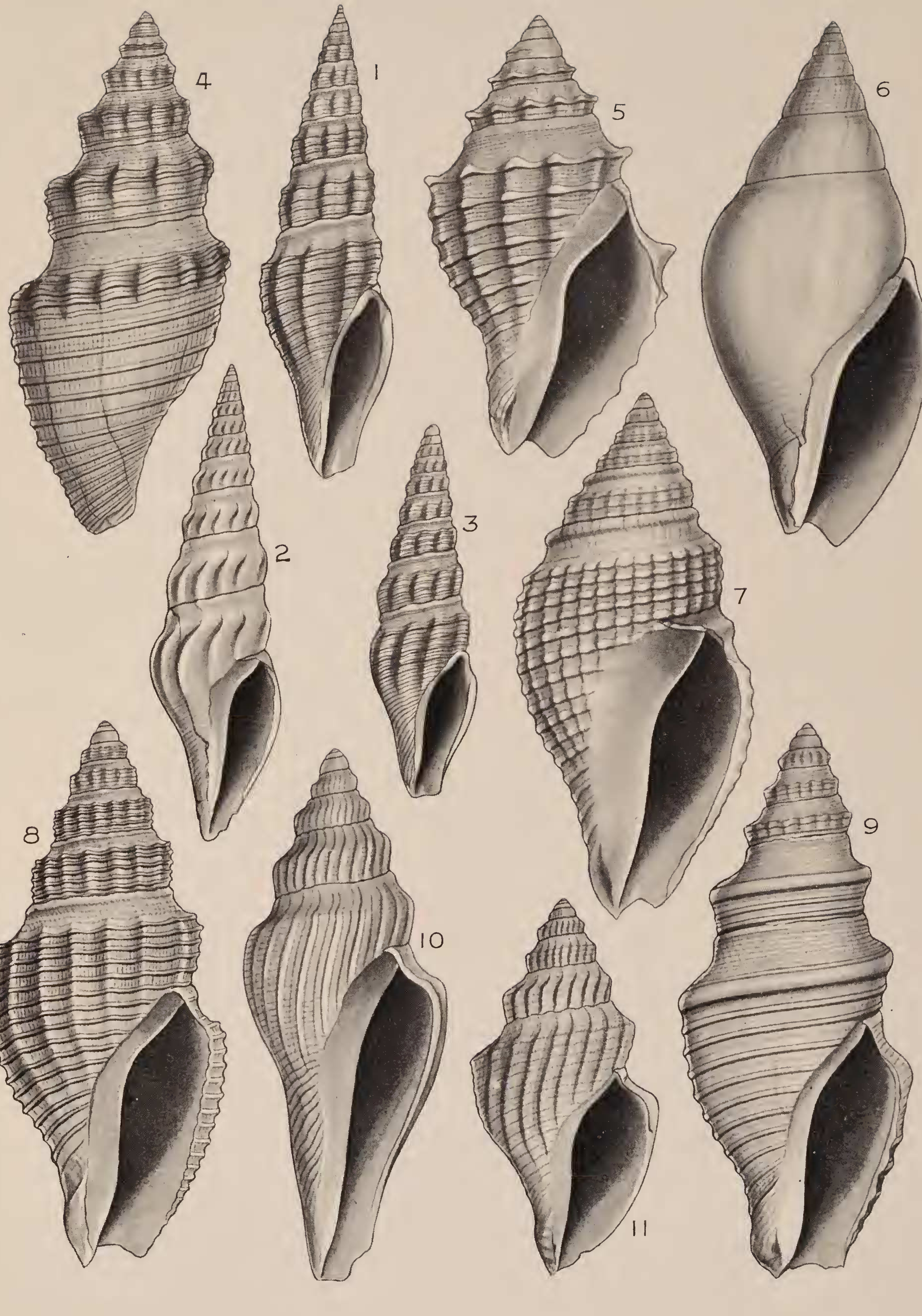
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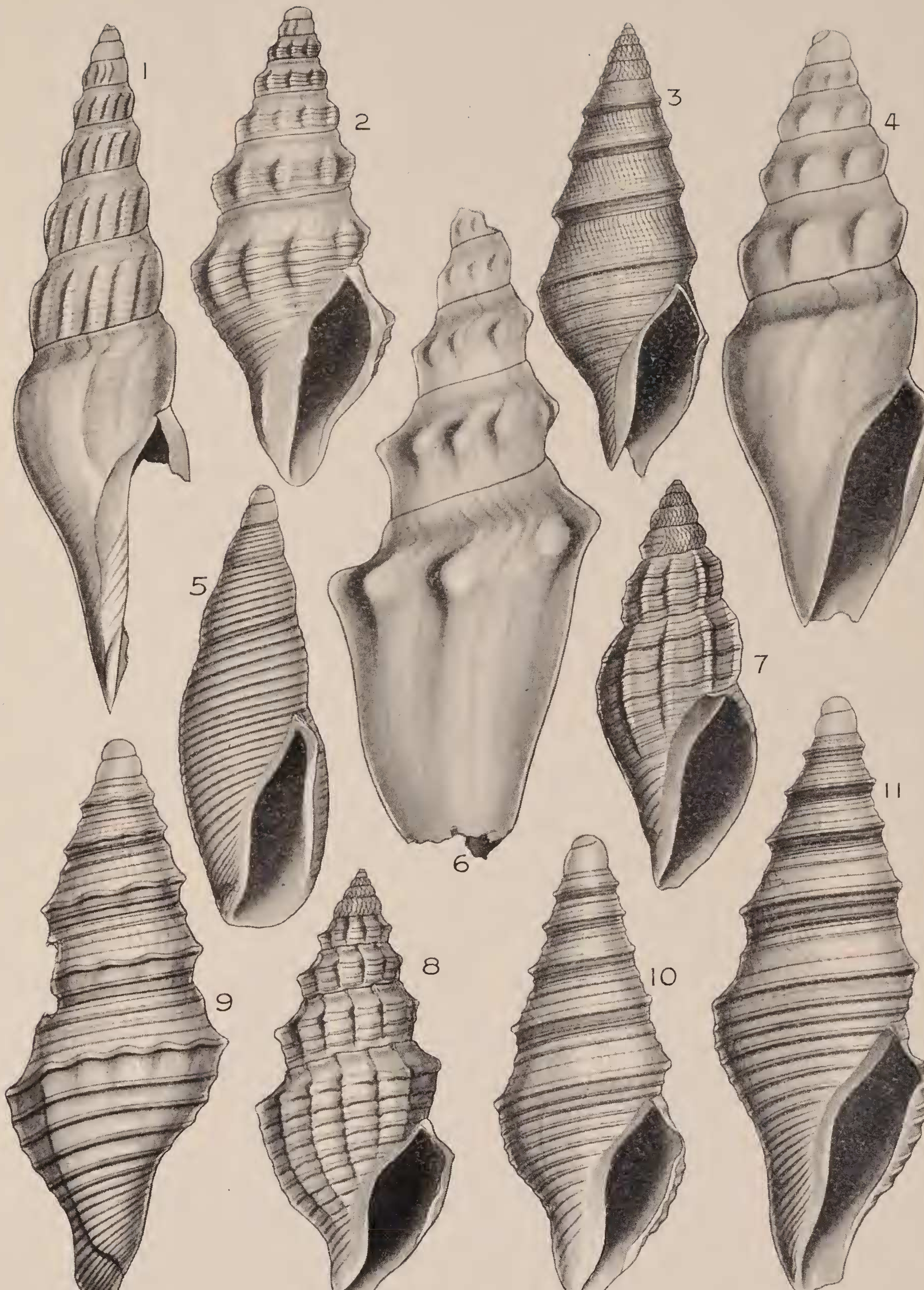
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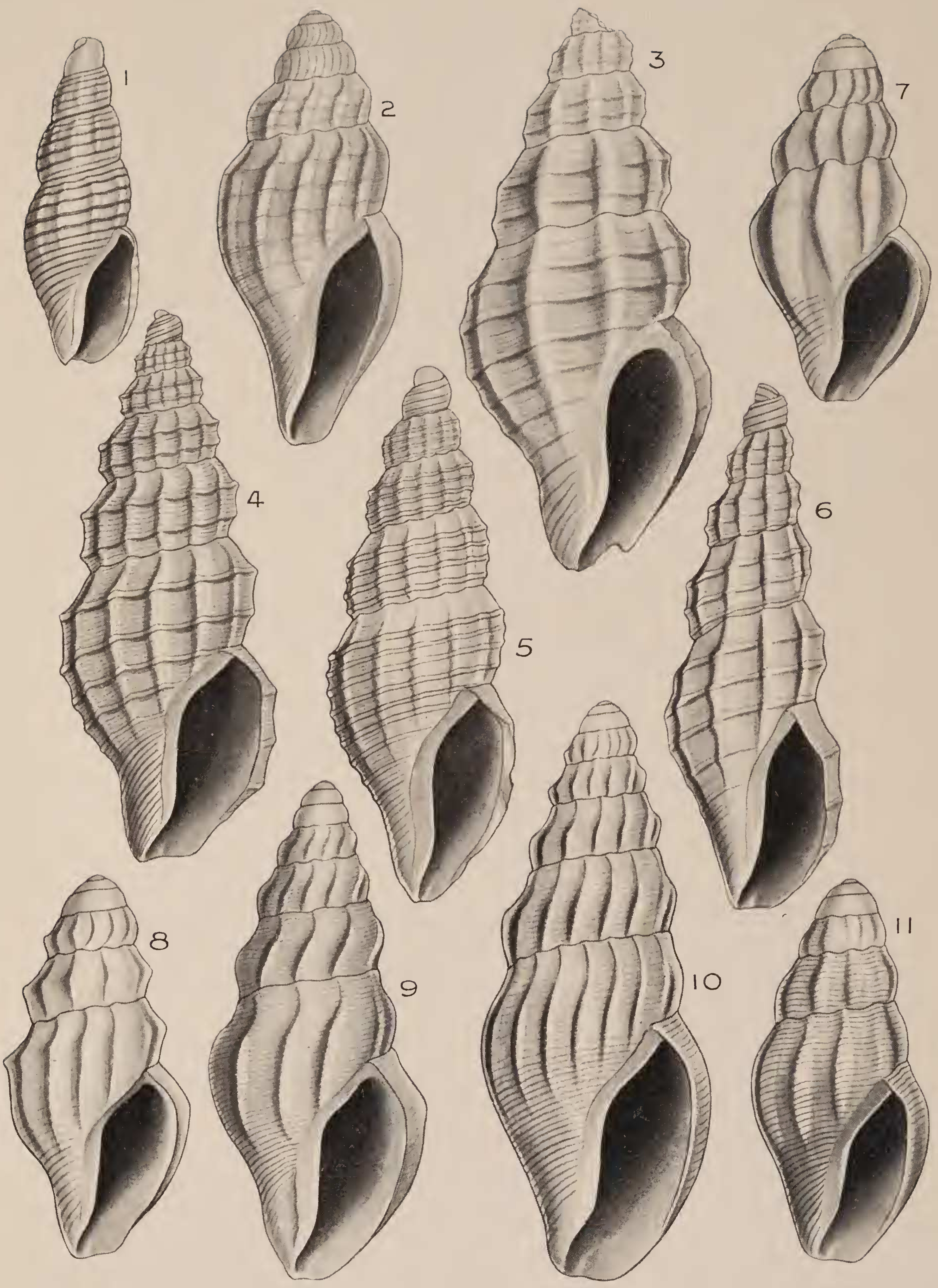
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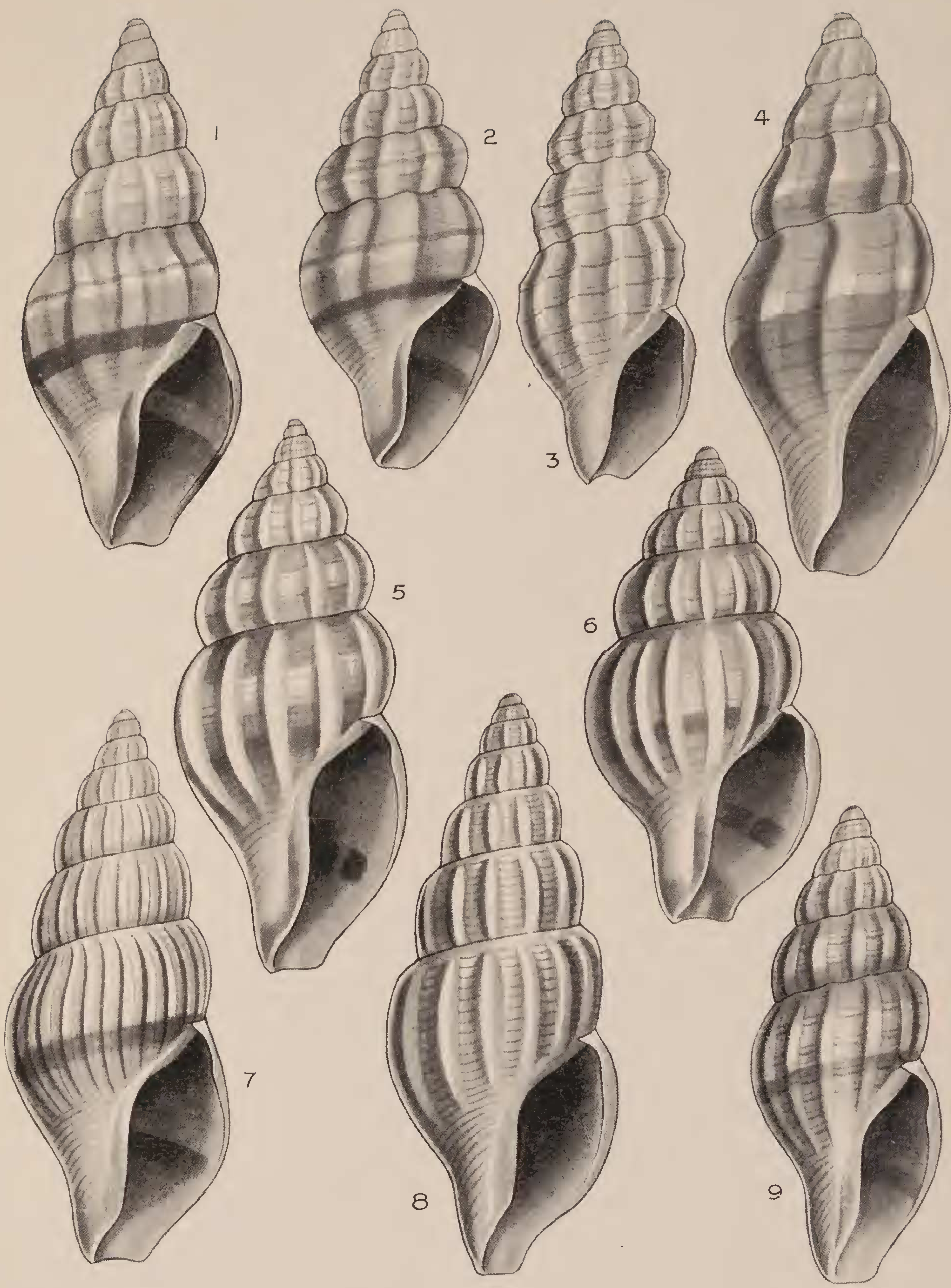

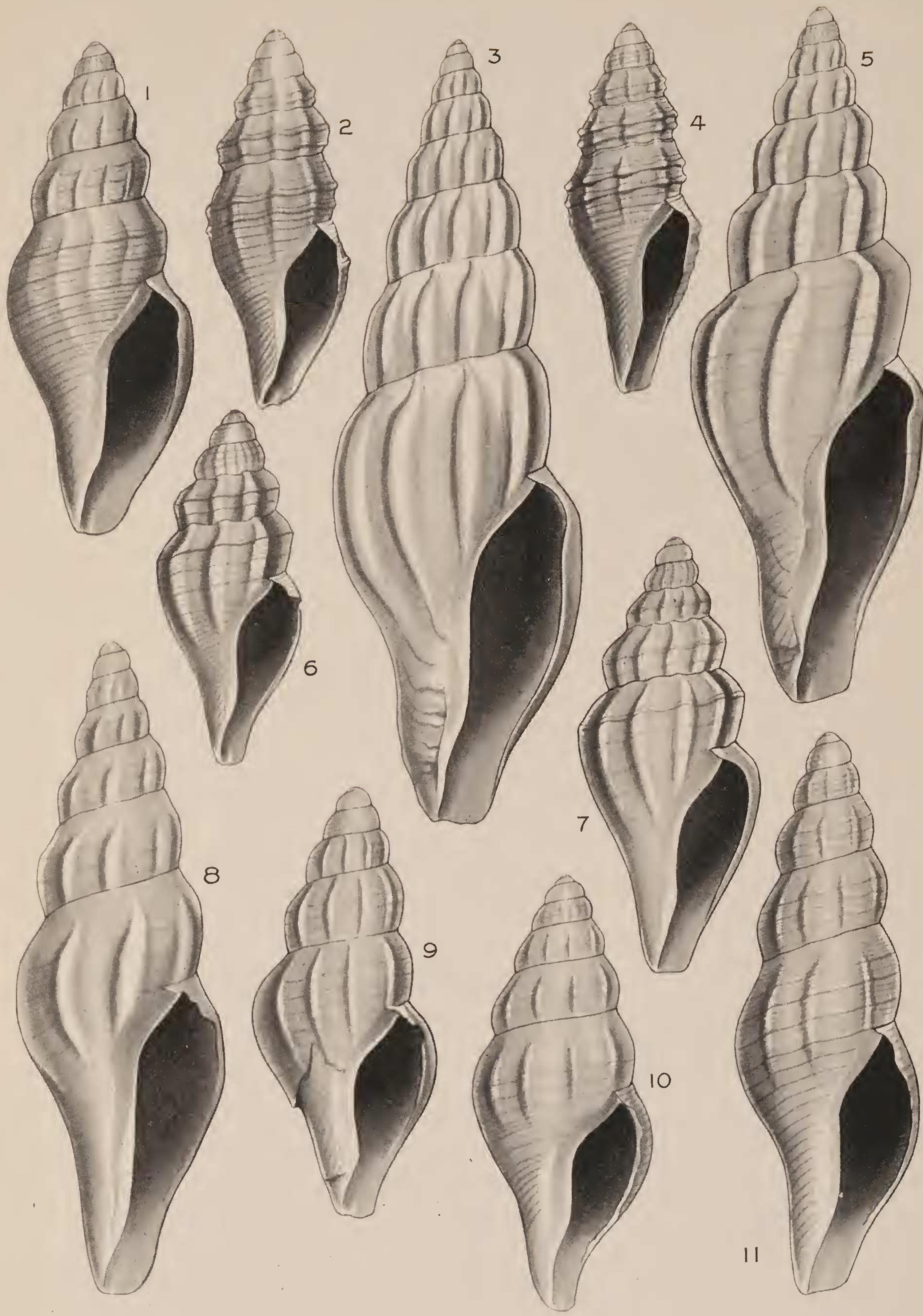

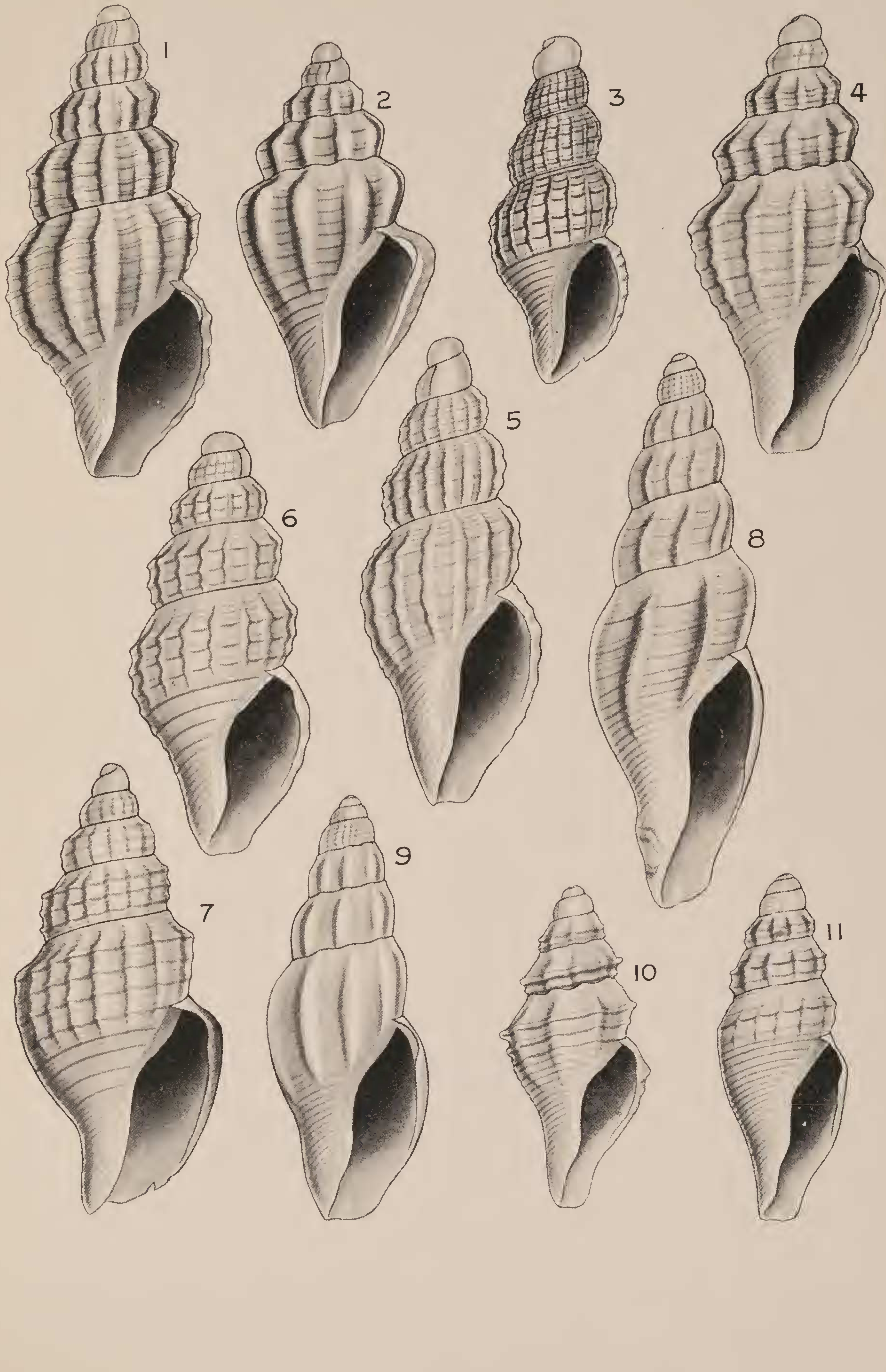
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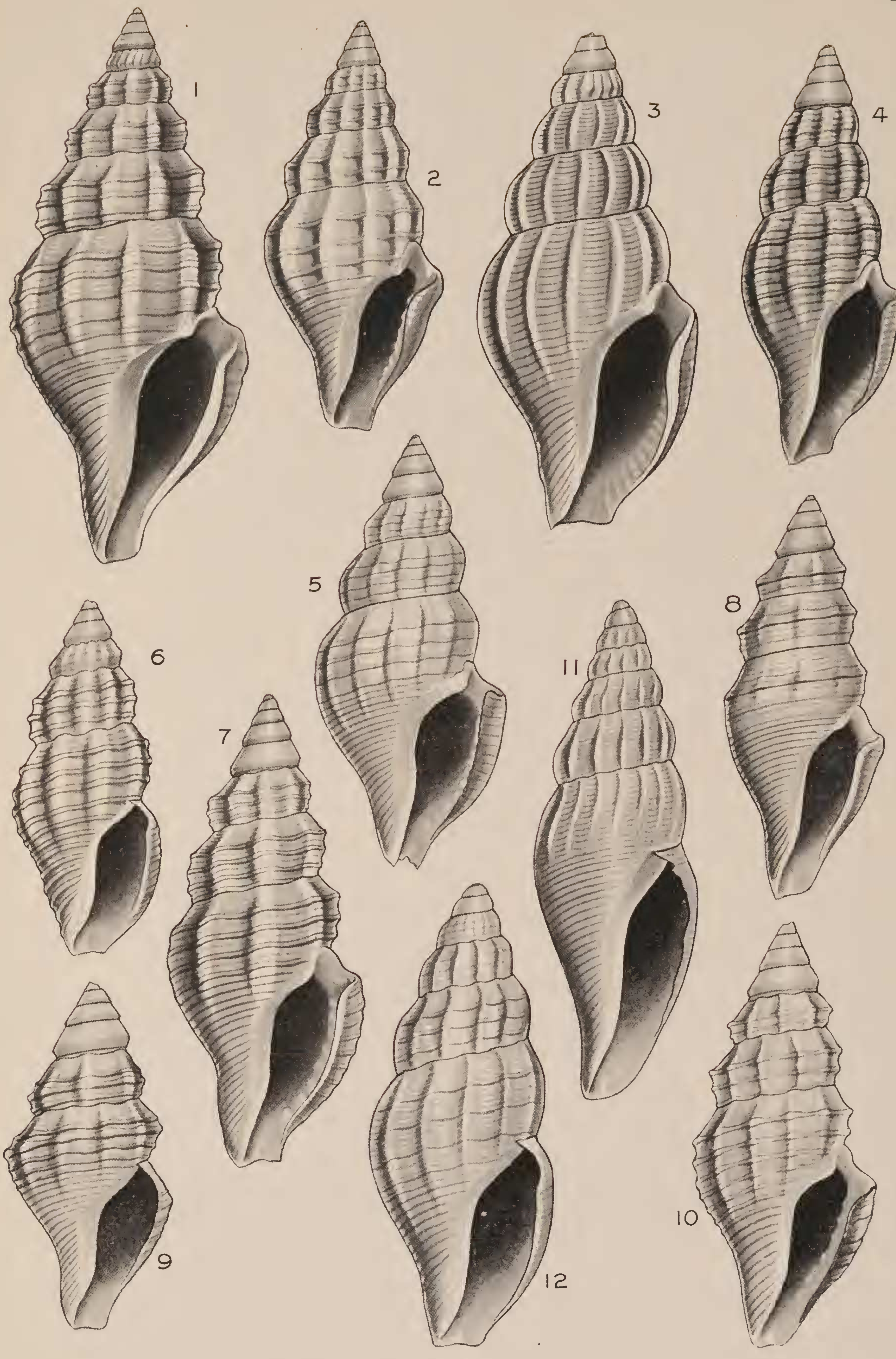
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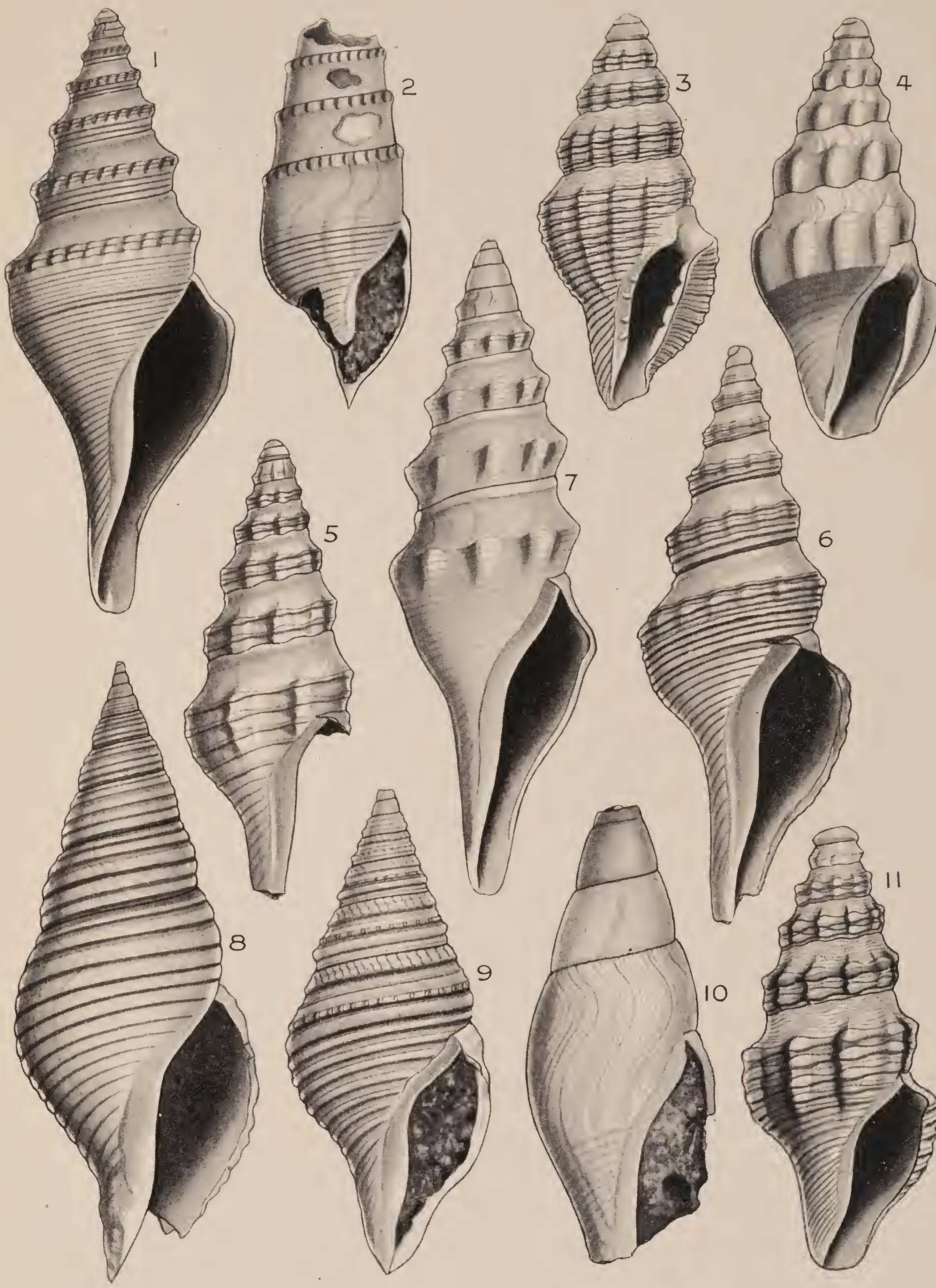
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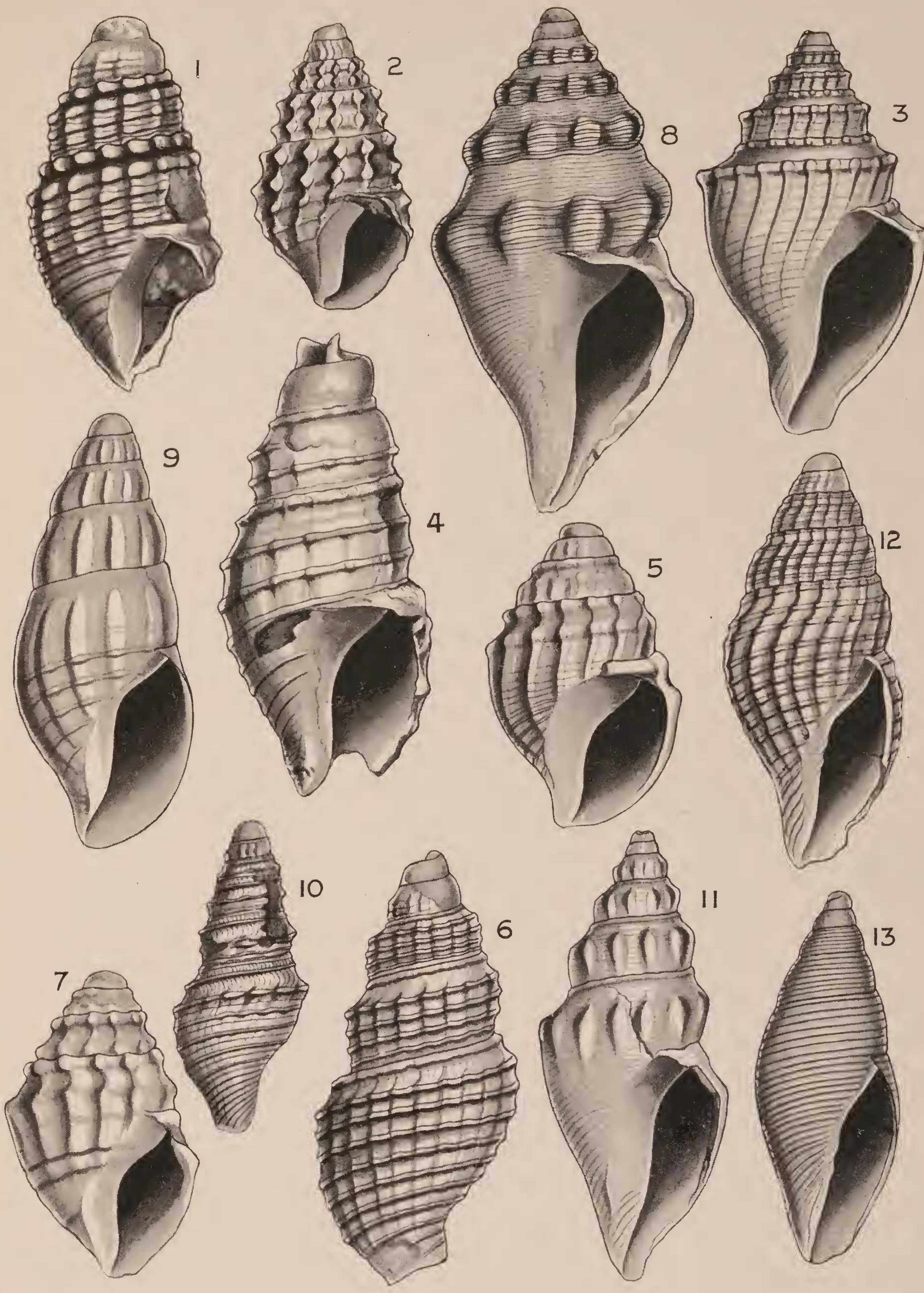
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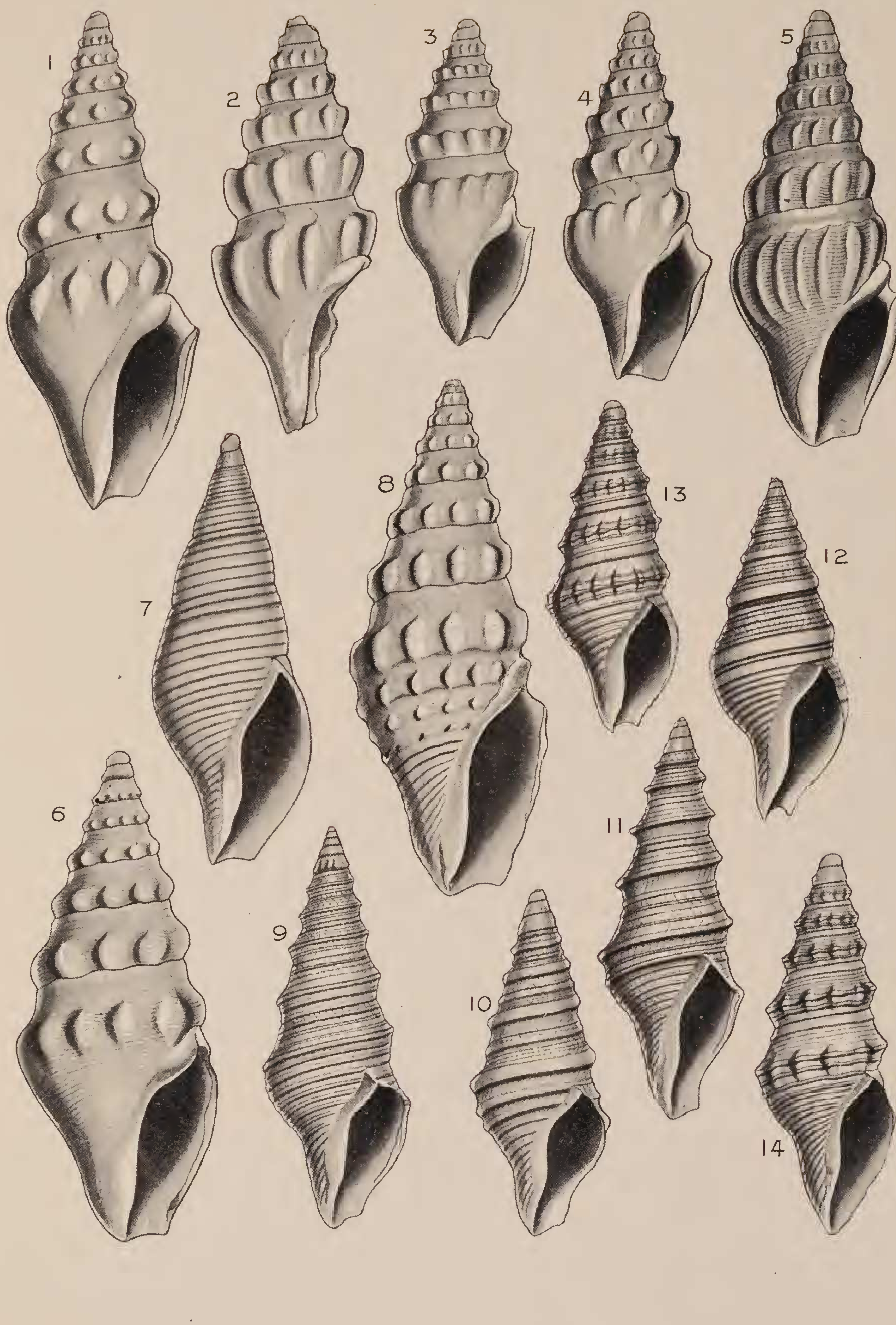
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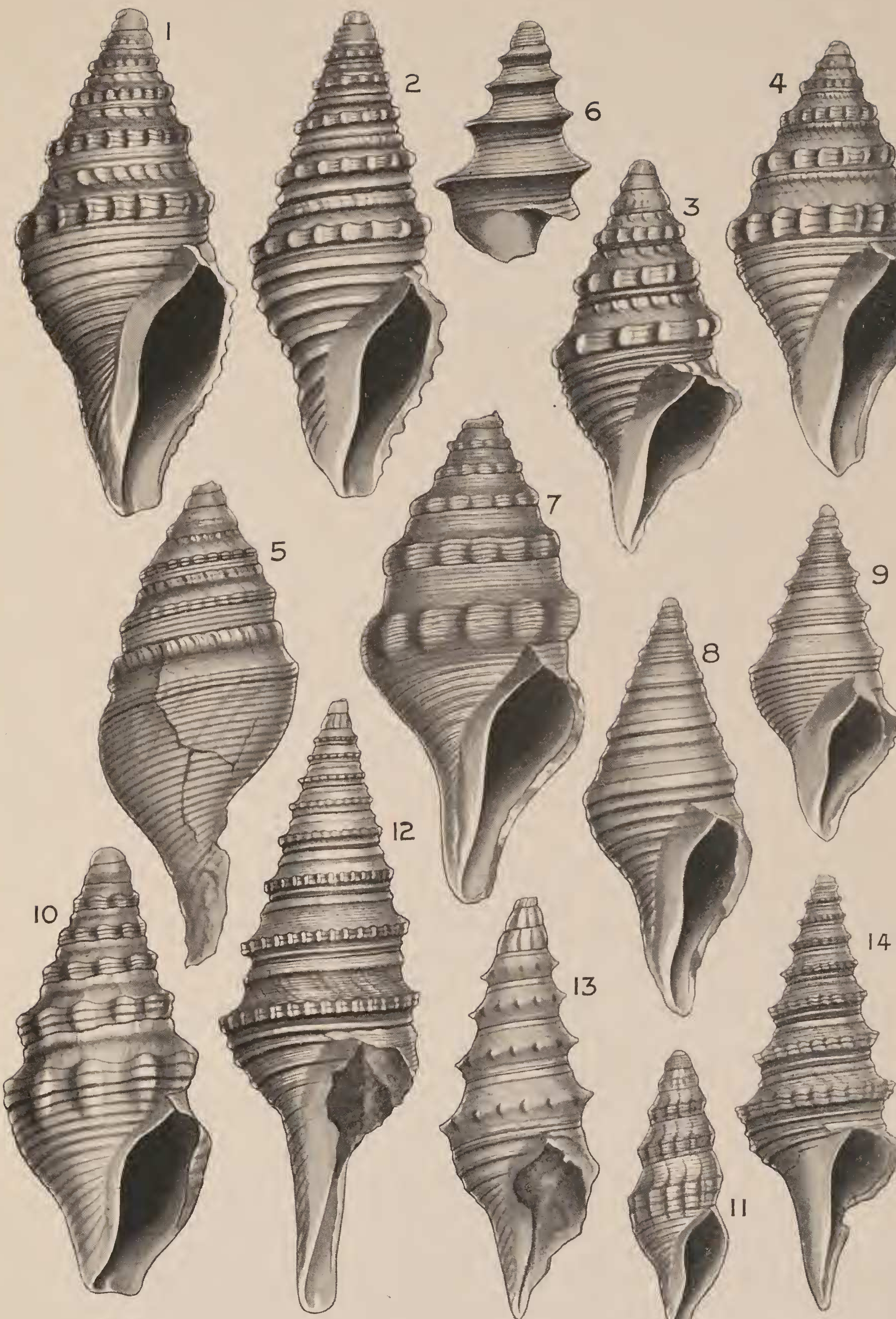
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Plate 14.